



Heat of Absorption of CO₂ in Aqueous Solutions of DEEA, MAPA and their Mixture

Waseem Arshad, Muhammad; von Solms, Nicolas; Thomsen, Kaj; Svendsen, Hallvard F.

Published in:
Energy Procedia

Link to article, DOI:
[10.1016/j.egypro.2013.06.029](https://doi.org/10.1016/j.egypro.2013.06.029)

Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Waseem Arshad, M., von Solms, N., Thomsen, K., & Svendsen, H. F. (2013). Heat of Absorption of CO₂ in Aqueous Solutions of DEEA, MAPA and their Mixture. *Energy Procedia*, 37, 1532-1542.
<https://doi.org/10.1016/j.egypro.2013.06.029>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



GHGT-11

Conference Programme

11th International Conference on
Greenhouse Gas Control Technologies

CCS: Ready to Move Forward

18th - 22nd November 2012

Kyoto International Conference Center - Japan



GHGT-11

Conference Programme

11th International Conference on
Greenhouse Gas Control Technologies

CCS: Ready to Move Forward

18th - 22nd November 2012

Kyoto International Conference Center - Japan

www.ghgt.info • ghgt11@ghgt.info

Contents

4

Steering Committee	4
Welcome	5
Meet The Organisers	6
Technical Programme Committee & Expert Review Panel	7
General Information	8
Chair and Presenter Guidelines	9
Social Programme	10
Plenary Sessions & Keynote Speakers	12
Final Panel Discussion & Closing Session	14
Conference Programme at a Glance	15
Oral Sessions at a Glance	16
Exhibition Information	18
Conference Floor Plan and Room Details	19
Oral Session Details	20
Poster Floorplan	40
Poster Session Details	42
Special Thanks	79
Sponsors / Supporters / Contributors	80

Steering Committee

As you can imagine, a lot of preparation and work goes into the establishment of the GHGT conferences, and a large part of this work is conducted by the Steering Committee. The Steering Committee is comprised of a mix of representatives from the hosts; in the case of GHGT-11, RITE, and the conference custodians, IEAGHG.

The Steering Committee is co-chaired by Prof. Kaya from RITE and Mr Gale from IEAGHG, and under their leadership the committee has arranged the conference, with assistance from the Technical Programme Committee (TPC) who worked from the Expert Review Panel suggestions to formulate the technical programme.

Some committee members perform dual roles, such as Prof. Yamaji and Mr Dixon, who co-chaired the TPC, and Mrs Twinning, who sits on the Steering Committee and acts as secretariat for the TPC.



Prof. Yoichi Kaya
(co-chair)



Mr. John Gale
(co-chair)



Prof. Kenji Yamaji



Mr. Tim Dixon



Mr. Takashi Honjo



Ms. Akemi Sasaki



Mrs. Siân Twinning



Mr. Toby Aiken

Welcome

The Steering Committee would like to take the opportunity to welcome you to the 11th International Conference on Greenhouse Gas Control Technologies, and to the beautiful city of Kyoto. As you are no doubt aware, the GHGT conference series has established itself as the premier international platform for the presentation of cutting edge research and the latest developments in CO₂ Capture and Storage technologies, and you are part of it.

When the series started in 1992, CCS was very much a novel concept with limited research at the laboratory scale underway around the world. Having seen a significant technological development in recent years, CCS is now at the phase where large demonstration projects operate around the world, which will be followed by commercial deployment.

To facilitate demonstration and deployment, developments are still needed in the areas of CO₂ capture, transportation, storage and the integration of these components, both in terms of reliability and efficiency. Legal and regulatory frameworks, funding, and communication with stakeholders on CCS will all require consideration in the surrounding political and financial environments.

This unique situation, with significant technological developments awaiting the final breakthroughs in the areas outlined above, led to the theme for the conference:

CCS: Ready to Move Forward.

Building on Previous Success

Since its 1992 inception, the conference has grown from strength to strength, and we are happy to see this trend continuing for this 11th event. With recent global economic conditions, there was a fear that delegate numbers and attendance would drop, but despite this, and the more remote location for many potential participants, it would appear that GHGT-11 has held its place, and continues to be the conference of choice for many researchers. It is anticipated that GHGT-11 will attract between 1200 and 1400 delegates, demonstrating this continued success.

GHGT-10, held in Amsterdam in 2010 held a very successful exhibition where delegates were able to get in touch with the exhibitors' technologies and experiences, and enter into free discussions relating to these technologies.

GHGT-11 will also hold an exhibition, to facilitate technology suppliers to get in touch with researchers again, and hopefully overcome barriers for widescale deployment, forge new relationships and partnerships and move CCS technology forward.

Social Programme

The social programme will comprise of a Welcome Reception and registration on Sunday the 18th of November, and a Conference Dinner on Wednesday the 21st of November. More information on this can be found on page 10.

Meet the Organisers

About RITE

The Research Institute of Innovative Technology for the Earth (RITE) was established in 1990 as a centre of excellence to conduct research on technologies for mitigating global warming, by the joint efforts of the government of Japan and Japanese industries.

The direction of its research activities is in line with the concept of the "New Earth 21" plan proposed by the Japanese government which envisages stabilisation of carbon dioxide concentrations in the atmosphere by developing long term innovative technologies for substantial reduction of carbon dioxide emissions.

RITE focusses its attention mainly on the following three areas:

- Bio-refinery technologies for transforming cellulose into biofuels,
- Technologies for carbon dioxide capture and storage (CCS), and
- Scenario studies on future paths toward low carbon society.

RITE has already conducted an experiment in 2003-04 of storing 10,000 tons of CO₂ in the subsurface at a depth of one thousand meters in Nagaoka, a city in Northern Japan, which provided a wealth of useful information on the behavior of CO₂ stored deep underground.

Recognising the international nature of global warming studies, RITE has been conducting research with intense collaboration with international institutions such as IIASA and DOE in USA.

RITE also hosted the second International Conference on Carbon Dioxide Removal (ICCDR-2) in 1994 and GHGT-6 in 2002 both in Kyoto.



About IEAGHG

The IEA Greenhouse Gas R&D Programme (IEAGHG) is an international collaborative research programme established in 1991 as an Implementing Agreement under the International Energy Agency (IEA).

The primary role of IEAGHG is to be an informed source of impartial information on greenhouse gas mitigation options. This is achieved by the instigation and management of research studies, technological evaluations, and maintenance of a series of international research networks that serve as a platform for academics, researchers and industrial parties to share information and experiences and to discuss new developments.

IEAGHG studies and evaluates technologies that can reduce greenhouse gas emissions derived from the use of fossil fuels. The Programme aims to provide its members with definitive information on the role that technology can take in reducing greenhouse gas emissions.

IEAGHG takes pride in being an informed but unbiased source of technical information on greenhouse gas mitigation.

The programme's main activities are:

- To evaluate technologies aimed at reducing greenhouse gas emissions,
- To help facilitate the implementation of potential mitigation options,
- To disseminate the data and results from evaluation studies, and
- To help facilitate international collaborative research, development and demonstration activities (R,D&D).



Technical Programme Committee and Expert Review Panel

The Technical Programme Committee (TPC) is responsible for the content, organization and programming of all the conference technical programme for GHGT-11. Over 1200 abstracts were received, and the initial task of evaluating these fell to the Expert Reviewers. These consisted of over 140 internationally recognised experts from 16 countries, and each abstract was independently reviewed by at least 2 experts.

The TPC evaluated these reviews, made decisions on the selection of papers, and allocated them to sessions. This task was extremely intensive. The organisers would like to thank both the TPC and the Expert Reviewers for their outstanding and diligent work; without them, there would be no technical programme for you to enjoy.

The TPC was greatly assisted by Mrs Siân Twinning who carried out the TPC secretariat duties.

The TPC are listed here, but the Expert Review Panel is too extensive to list in a printed programme, they are thanked all the same and they are listed with gratitude on the conference website:

www.ghgt.info.

7



Prof. Kenji Yamaji
(co-chair)



Mr. Tim Dixon
(co-chair)



Prof. Kozo Sato



Mr. Chris Hendriks



Dr. Howard Herzog



Prof. Sally Benson



Prof. Olav Bolland



Ms. Peta Ashworth

General Information

Cloakroom & Luggage Facilities

The Kyoto International Conference Center has 2 cloakrooms on the ground floor where luggage may be left. All personal belongings must be collected by the end of the day.

Emergency Contact Numbers

While we will ensure that every aspect of the conference runs without a hitch, if for any reason you are in need of emergency assistance, the following numbers should be used while in Japan.

Police:	110
Fire Service / Ambulance:	119

Public Transport - Getting Around Kyoto

The Kyoto International Conference Center has its own stop on the Karasuma Line, and the stop is Kōkusaikaikan (K01) Station. Kyoto's subway system is quick and convenient, and most areas are accessible using the subway. There are two lines, one running North-South; the Karasuma Line, and one running East-West; the Tozai Line. Included in your registration is a 5 day pass for the subway, valid for travel from Sunday the 18th of November to Thursday the 22nd of November.



GHGT-11 Blog and Twitter Hashtag

For the first time, a GHGT conference has its own dedicated blog site and pre-determined Twitter Hashtag. The Blog will be regularly updated with interesting points raised for discussion, and will hopefully generate a lively debate.

Please use #GHGT11 in your tweets, so that all tweets can be easily and quickly found and read. We may even use some of these in the Conference Summary Brochure.

The Blog can be found at www.ghgt-blog.org and is a Wordpress blog, so either download the Wordpress app to comment on the move, or alternatively, view the blog online, and click the [Follow](#) link for new posts to be delivered to your email inbox.

Wireless Internet

Wireless LAN will be available in the main lobby and outside the conference rooms while in the Kyoto Conference Center.

Language & Translation

All presentations, plenary, keynote and technical, will be in English, however a subsidy has been made by Global Industrial and Social Progress Research Institute (GISPRI) for simultaneous translation of the plenary, keynote and closing sessions into Japanese.

This money has been donated specifically to fund this, and sits outside of the funding for the conference, and is not paid for in any way by delegate registration fees or sponsorship.

The organisers would like to take this opportunity to thank GISPRI for this facility, and explain a little about the organisation.

GISPRI was established as a public interest corporation on December 1, 1988, under the provisions of Article 34 of the Civil Code and the authorization of the Minister of International Trade and Industry.

Their objective is to conduct research in a broad spectrum of issues related to global resources, environment, international regimes, industry, economy, culture and society, based on its awareness that the role and responsibility of Japan in the international community has been mounting in tandem with Japan's increasing economic and social presence. GISPRI also seeks to present policy proposals based on its research and surveys for both domestic and international entities, while promoting exchange of information and ideas to help contribute to the prosperity of the global society.

More information is available at www.gispri.or.jp

Orizuru (Folded Crane)

This Orizuru created by Japanese traditional origami paper, is the same one seen flying in the short video screened at the Opening Session. The production of the video is also specifically funded by GISPRI.



愛・地球博成果継承発展助成事業
一般財団法人 地球産業文化研究所

Chair & Presenter Guidelines

Information for Session Chairs

Please take a moment to identify the session you are chairing or co-chairing and identify its location using the conference centre map shown on page 19. Please ensure that you arrive at your session room before the session commences, to allow the technical assistants to explain any specific functionality of the room and to allow session speakers to make themselves known to you.

Information for Speakers in an Oral Session

Again, using the map shown on page 19, please ensure you arrive at your designated session room with plenty of time to spare to ensure that you are familiar with the presentation and AV equipment in the room, and make your presence known to the session chairs.

Each presentation in the technical parallel sessions is allocated 15 minutes for the presentation, and 5 minutes for subsequent questions. All presenters are asked to stick to their allocated time, as the smooth running of the conference relies on strict adherence to the time schedule. The session chair will notify you of how your allocated time is progressing, and will manage the time allocated to questions.

Presenters are asked to upload their presentations no later than the day before your scheduled talk; note that if you are due to present on Monday the 19th, you will be required to upload your presentation on Sunday the 18th at the registration and welcome reception.

Information for Poster Presenters

Presenters of posters are required to locate their allocated poster board and ensure that their poster is mounted by the end of Monday in preparation for the poster sessions on Tuesday and Wednesday.

The event hall will be open between 09.00-17.30 on Monday the 19th of November for presenters to mount their poster. You will be provided with push pins to allow you to mount your poster, and these will be available from the administration desk within the poster hall.

For confirmation of board numbers, please see poster board allocations in the poster session details on pages 42-79. The posters must remain on display until Thursday afternoon as the posters will be accessible during lunch and breaks as well as during the dedicated sessions.

To facilitate discussions and conversations with the poster authors, there are 2 poster sessions scheduled, for further information, please see the poster floorplan and session details from pages 40 onwards.

Posters should be removed during the lunch break on Thursday the 22nd of November. Any posters remaining after 14.00 on this day will be disposed of. Unfortunately the organisers are not able to accept any responsibility to store or return to authors posters that remain on display past this deadline.

Greenman Award, 2012

The GHGT conference series has a tradition of making an award to an individual whose vital contributions towards progressing the CCS technologies, and enhancing our understanding of the process of mitigating greenhouse gas emissions, is recognised.

The 2012 Greenman Award recipient has been identified, and the award will be made at the conference dinner on Wednesday the 21st.

Former recipients of this prestigious award are:

Meyer Steinberg; 1996

Wim Turkenburg; 1996

Yoichi Kaya; 1996

Olav Kårstad; 2006

William D. Gunter; 2008

Howard Herzog; 2010

Peter Cook; 2010

Social Programme

The GHGT-11 Steering Committee have organised a 2-part social programme for the conference, commencing with a Welcome Reception, and concluding with the Conference Dinner.

Welcome Reception, Sponsored by the Global CCS Institute

The Welcome Reception will run alongside the conference registration on the evening of Sunday the 18th of November, at the Hotel Granvia Kyoto.

The Hotel Granvia Kyoto, Registration & Welcome Reception, Sunday 18th November, 17.30 - 21.00



The Registration and Welcome Reception opens from 17.30 until 21.00 on the 18th of November. Any delegate who is unable to attend the reception can obtain their badge and delegate pack each morning at the conference venue.

The Welcome Reception gives delegates a chance to listen to a few select speakers, welcoming you all to the conference and to Kyoto itself. Delegates will also have ample opportunity for networking, to reacquaint with old contacts, and forge new relationships for the future.

The reception will include a welcome address by John Gale of IEAGHG. This will be followed by addresses by the Kyoto Prefectural Governor and the Kyoto City Mayor. Brad Page of the Global CCS Institute will then address the delegates which will be followed by a traditional Kagami-Biraki Ceremony. This involves a ceremonial mallet being used to break the seal of a Japanese Sake barrel.

The delegate pack will also include your 5-day Kyoto subway pass, so be sure to keep this safe as it will facilitate easy travel between the conference venue, your hotel and the beautiful city of Kyoto.

Conference Dinner

The Conference Dinner for GHGT-11 will be held in the Westin Miyako Hotel Kyoto, which stands on the Higashiyama Hills, to the East of the city, overlooking the beautiful ancient capital. Please use your subway pass to reach the hotel which is located close to the subway Keage (T09) station. The use of buses or taxi's is not recommended due to heavy traffic.

The Conference Dinner is traditionally the highlight of the social programme, and this year it promises to be no different. The relaxed evening provides ample opportunities to reflect on the previous 3 days of successful presentations, and to indulge in a spot of local culture. It also provides a relaxed environment in which to unwind a little and continue to network with colleagues and contacts old and new.

11

*The Westin Miyako Hotel Kyoto, Conference Dinner,
Wednesday 21st November, 19.00 - 22.00*



There will be a few short presentations and speeches to accompany the dinner, and you are encouraged to come along and celebrate the success of the conference.

The Conference Dinner will also be the point at which the Greenman Award is presented for GHGT-11.

GHGT-11 Student Reception

As with previous GHGT events, the Student Reception enables students to meet and discuss what they have heard with their peers, as well as selected industry experts to help to build the blocks for their future careers within CCS and to forge new connections and business contacts.

The GHGT-11 Student Reception will be held in the Banquet Hall Swan of the Kyoto International Conference Center on the evening of the 20th of November, between 18.00 and 20.00.

Invitations to this event will be restricted to students of the GHGT-11 Student Mentoring Programme, IEAGHG International CCS Summer School Alumni, invited students registered for GHGT-11 and selected experts from industry and academia, chosen to encourage student-expert networking and collaborations.

The evening will include an informal introduction and welcome to the students on behalf of IEAGHG, a keynote presentation from an industry expert and further networking with refreshments available.

Plenary Sessions & Keynote Speakers

Monday 19th November, 09.00 - 11.00

Chair: Dr. Kelly Thambimuthu, Chair of IEAGHG ExCo

Welcome Addresses:

Professor Yoichi Kaya, President, RITE



Graduating from the University of Tokyo in 1957, Professor Kaya joined RITE in 1998 as Director General and became the President in 2011. He specialises in system engineering in the fields of energy and environment, and has a particular interest in global warming issues.

Mr Koichi Akaishi, METI



Mr Akaishi is the Deputy Director General for Global Environmental Affairs at METI. In a long and impressive career history, he has held several other Director level positions within METI, as well as for JETRO based in Brussels. He graduated with an LLB from the University of Tokyo, and will give a welcome address on behalf of the host government.

Keynote Talks:

'Aiming for True Harmony between Energy and the Environment'

Mr Atsutoshi Nishida, Chairman of the Board, TOSHIBA.



Mr. Nishida joined Toshiba Corporation in 1975, and following assignments that included serving as Senior Vice President of Toshiba Europe and President of Toshiba America Information Systems, he was appointed President and Chief Executive Officer of Toshiba in 2005.

'International Progress on CCS: Current Status and Recommendations for the Future'

Mr Brad Page, CEO, Global CCS Institute



Prior to his role at the Institute, Brad served as CEO of the Energy Supply Association of Australia, and also served as an active member of the Australian Government Business Roundtable on Climate Change, the CSIRO Energy Transformed Flagship Advisory Committee, and the Australian Government Energy White Paper High-Level Consultative Committee.

'CCS Projects are Becoming Reality - the USA Demonstration Program'

Dr Jay Braitsch, Senior Advisor,
Office of Fossil Energy USDOE.



Jay has worked in various program offices including fossil, renewable, nuclear and energy efficiency. Current activities focus on a variety of cost-reduction CO₂ capture/utilisation technologies, as well as safe and permanent CO₂ storage. Jay earned a BS in Electrical Engineering from Cornell University, and a PhD in Systems Engineering from Ohio State University.

Tuesday 20th November, 08.30 - 09.20

Chair: Mr. John Gale, General Manager, IEAGHG

Technical Plenary Speakers

'A Global Vision for CCS - Revisiting the IEA CCS Roadmap'

Mr. Juho Lipponen, Head of CCS Unit, IEA



Juho manages a team of six specialists analysing various aspects of CCS, from technical and economic issues to policies, incentives and regulatory frameworks. Prior to joining the IEA, Mr Lipponen worked for the European power industry federation, Eurelectric, as Head of the Energy Policy and Power Production Unit.

'The Global Gas Supply Revolution - Scale, Cost and the Implications for CCS'

Dr. Francis O'Sullivan, Executive Director, Energy Sustainability Challenge programme, MIT



Frank's research interests span a range of topics related to energy systems and energy economics. His current work is focused on the energy-water nexus, and on unconventional oil and gas resources, particularly the production dynamics and associated economics of North America shale plays. Prior to joining MIT, he acted as a consultant with McKinsey & Company.

Wednesday 21st November, 08.30 - 09.20

Chair: Mr. Tim Dixon, Manager: CCS & Regulatory Affairs, IEAGHG

Technical Plenary Speakers

'GHGT 101: Carbon Storage in Japan'



Dr. Kozo Sato, Director, Frontier Research Centre for Energy and Resources, The University of Tokyo

Studying at the University of Tokyo, and Stanford University, Dr. Sato gained first his B.E. degree, then a Ph.D. in the Petroleum Engineering Department. He went on to work for the Teikoku Oil Company, before joining the University of Tokyo, first as an associate professor, then a full professor, where he remains as Director of the Frontier Research Centre for Energy and Resources.

'Deployment of CO₂ Capture Technology in Energy Intensive Industry - Challenges Ahead: A Case Study for the Steel Industry'

Henk Reimink, Executive Director, Energy Sustainability Challenge Programme, World Steel Association



Henk joined the World Steel Association in November 2008 being accountable for all activities on Safety and Health, manufacturing processes and systems in the iron and steel industry value chain and Climate Change mitigation techniques as well as a global regulatory overview.

Thursday 22nd November, 08.30 - 09.20

Chair: Mr. John Gale, General Manager, IEAGHG

Technical Plenary Speakers

'Overview and Recent Developments on CO₂ Transport Infrastructure'

Chris Hendriks, Managing Consultant, Ecofys



Chris Hendriks is an international consultant on sustainable energy. He received his PhD in 1994, with a thesis on CO₂ removal from coal-fired power plants. He was an initiator of the ICCDR conference series which later merged to form the GHGT conference series. He works as an advisor in the field of CCS, renewables and energy efficiency for both government and private organisations.

'Beyond Kyoto - More Effective Framework for Climate Change'

Keigo Akimoto, Chief Researcher and Group Leader of the Systems Analysis Group, RITE



Keigo holds a Ph.D. and is a guest professor of the Graduate School of Art and Science, University of Tokyo, and a lead author of Working Group III of the Intergovernmental Panel on Climate Change (IPCC) for the 5th assessment reports. He is also a member of several advisory committees on energy and environmental policy for Japanese government.

Final Panel Discussion and Closing Session

Final Panel Discussion,

Thursday 22nd November, 14.00 - 15.30

'As a Countermeasure to Global Warming - Best Mix on Energy Portfolio and Enhancing International Cooperation'

The final panel discussion for GHGT-11 will be chaired by Professor Kenji Yamaji, and will address the topic above by discussion with a panel of leading experts.

Panelists:

- Juho Lipponen, Head of CCS Unit, IEA, France
- James Edmonds, Laboratory Fellow and Chief Scientist, Joint Global Change Research Institute, PNNL, USA
- Jiang Kejun, Director for Energy System Analysis and Market Analysis Center, Energy Research Institute, China
- Takeo Kikkawa, Professor, Graduate School of Commerce and Management, Hitotsubashi University, Japan
- Yoshiharu Tachibana, Research Advisor, Central Research Institute of Electric Power Industry, CRIEPI, Japan

Closing Session,

Thursday 22nd November, 15.30 - 16.00

This session will be co-chaired by Mr John Gale and Professor Yoichi Kaya, representing the co-hosts of the GHGT-11 conference.

The closing session of a GHGT conference traditionally consists of notes of thanks being presented, and a simple conclusion of key points and themes that have emerged over the past few days technical presentations.

Reflections on advances, and developments will be highlighted, and the conference will be formally called to a close.

The last part of the closing session will comprise of an invitation, made by the hosts of GHGT-12 which will be held in 2014.

The new hosts will make a short presentation on their home venue, and invite delegates to return in 2 years to continue to maintain the strong name of the GHGT Conference Series. A short video will be shown, which will showcase the host city, and give delegates a taste of what to expect in 2014.

Conference Programme at a Glance

Sunday 18 th November	Monday 19 th November	Tuesday 20 th November	Wednesday 21 st November	Thursday 22 nd November
	07.45 - 09.00 Registration & Coffee	08.00 - 08.30 Registration & Coffee	08.00 - 08.30 Registration & Coffee	08.00 - 08.30 Registration & Coffee
	09.00 - 11.00 Welcome & Keynote Address	08.30 - 09.20 Plenary Session	08.30 - 09.20 Plenary Session	08.30 - 09.20 Plenary Session
		09.30 - 10.50 Technical Session 4	09.30 - 10.50 Technical Session 7	09.30 - 10.50 Technical Session 10
	11.00 - 11.30 Coffee Break	10.50 - 11.20 Coffee Break	10.50 - 11.20 Coffee Break	10.50 - 11.20 Coffee Break
	11.30 - 12.50 Technical Session 1	11.20 - 12.40 Technical Session 5	11.20 - 12.40 Technical Session 8	11.20 - 12.40 Technical Session 11
	12.50 - 14.10 Lunch	12.40 - 13.40 Lunch	12.40 - 13.40 Lunch	12.40 - 14.00 Lunch
	14.10 - 15.30 Technical Session 2	13.40 - 15.40 Poster Session A	13.40 - 15.40 Poster Session B	14.00 - 15.30 Final Panel Discussion
	15.30 - 16.00 Coffee break			15.30 - 16.00 Closing Session
	16.00 - 17.20 Technical Session 3	15.40 - 17.20 Technical Session 6	15.40 - 17.20 Technical Session 9	
17.30 - 21.00 Registration & Welcome Reception, Hotel Granvia Kyoto			19.00 - 22.00 Conference Dinner, Westin Miyako Kyoto	

15

Oral Sessions at a Glance

16

		Main Hall Stream A	Room A Stream B	Room B-1 Stream C
Monday Nov 19 th	Technical Session 1 11.30 - 12.50	Storage Capacity	Post-Combustion: Solvent Pilots	Negative CO ₂
	Technical Session 2 14.10 - 15.30	CO ₂ Injectivity	Post-Combustion: Solvent Alternatives	Demonstration Projects: Storage
	Technical Session 3 16.00 - 17.20	Environmental Impacts of CO ₂ Storage	Post-Combustion: Two-Phase Solvents	Demonstration Projects: USRCSP
Tuesday Nov 20 th	Technical Session 4 09.30 - 10.50	Experiences and Case Studies	Post-Combustion: Environment Characterisation	Demonstration Projects: Policy Related Issues
	Technical Session 5 11.20 - 12.40	Monitoring: Demonstration & Pilot Projects	Post Combustion: Modelling	Demonstration Projects: Capture & Transport
	Technical Session 6 15.40 - 17.20	Site Characterisation & Selection	Sorbent Systems	Demonstration Projects: Post-Combustion Capture
Wednesday Nov 21 st	Technical Session 7 09.30 - 10.50	Trapping Mechanisms: Case Studies	Post-Combustion: Environmental Aerosol	System Integration I: Power Systems
	Technical Session 8 11.20 - 12.40	Risk Assessment & Management I	Post-Combustion: Advanced Solvents	System Integration II: Infrastructure
	Technical Session 9 15.40 - 17.20	Reservoir Engineering: Pressure Management	Chemical Looping	Policy: Other
Thursday Nov 22 nd	Technical Session 10 09.30 - 10.50	Risk Assessment & Management II	Post-Combustion: Design	Emerging Technologies
	Technical Session 11 11.20 - 12.40	Modelling: Reservoir Scale Flow & Transport	Post-Combustion: Solvent Fundamentals	CCS & Geothermal

Session Theme Key

Capture	Storage	Integrated Systems	Industrial Sources	Public Perception
Negative CO ₂ Emissions	Panel Discussion	Demonstration	Utilisation of CO ₂	Legal Issues
Policy	Commercial Issues	Transport	Education	Other Storage Options

Room D Stream D	Room B-2 Stream E	Room C1 Stream F	Room E Stream G
Tech. Assessment I: Cost & Risk	Techno-Economic Comparisons	Wellbore Integrity	Industrial Sources
Tech. Assessment II: Operational Flexibility	Membranes	Modelling: Nano Scale to Core Scale	Industrial Sources
Panel Discussion: CCS in Asia	Enhanced Hydrocarbon Recovery I	Modelling: Managing Uncertainty	Commercial Issues
Panel Discussion: Costs of CCS	Enhanced Hydrocarbon Recovery II	Monitoring: Pressure Methods	Retrofitting
Panel Discussion: Renewable Energy & CCS	Post-Combustion: Environmental Nitrosamine	Reservoir Engineering: Multi-Phase Flow of CO ₂ & Brine	Transport & Infrastructure
Panel Discussion: Weyburn-Midale	Oxy-Combustion: Combustion Fundamentals	Legal & Regulatory	Transport & Infrastructure
Panel Discussion: CCS Demonstrations	Capture Pre- Combustion: Process	Monitoring: Geochemical Methods	Policy: Emissions Trading
Panel Discussion: Storage Capacity	Novel Systems	Monitoring: Geophysical Imaging	Education
Public Perception: Communication Activities & Experiences	Oxy-Combustion: CO ₂ Processing Unit	Trapping Mechanisms: Geochemical	Transport & Infrastructure
Public Perception: Social Science Research	Pre-Combustion: Technology	Trapping Mechanisms: Capillarity & Heterogeneity	Other Underground Storage Options
Risk Management: Contingency Planning & Remediation	System Integration III: Other	Ex-Situ Mineralisation of CO ₂	Oxy-Combustion: Large Scale Implementation

Exhibition Information

The GHGT-11 exhibition aims to facilitate networking between technology suppliers and researchers, and provides an opportunity for partnerships and agreements to be forged for the future. Sponsors are also allocated a booth in the exhibition hall.

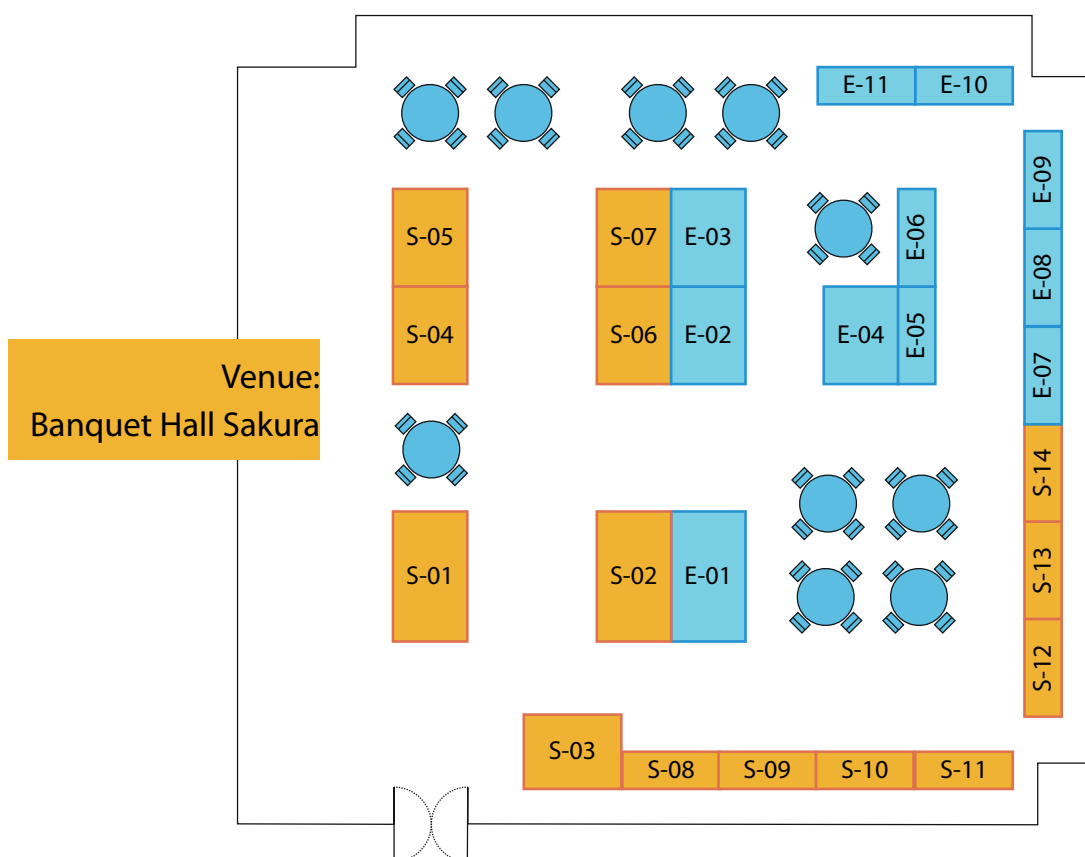
The Exhibition will be held in the Banquet Hall Sakura, located close to the main hall.

Sponsors, Supporters and Organisers Booths

- S-01 IEAGHG
- S-02 Research Institute of Innovative Technology for the Earth (RITE)
- S-03 GLOBAL CCS INSTITUTE
- S-04 Schlumberger Carbon Services
- S-05 Hitachi, Ltd.
- S-06 TOSHIBA CORPORATION
- S-07 MITSUBISHI HEAVY INDUSTRIES, LTD.
- S-08 Gassnova / TCM
- S-09 JX Nippon Oil & Energy Corporation
- S-10 JGC CORPORATION
- S-11 Japan Petroleum Exploration Co., Ltd. (JAPEX)
- S-12 CHIYODA CORPORATION
- S-13 IHI
- S-14 Supporters

Exhibiting Companies and Organisations Booths

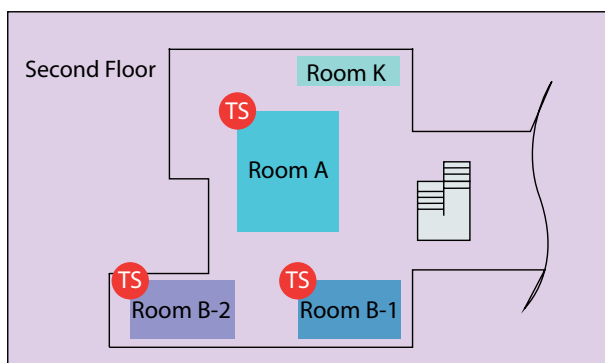
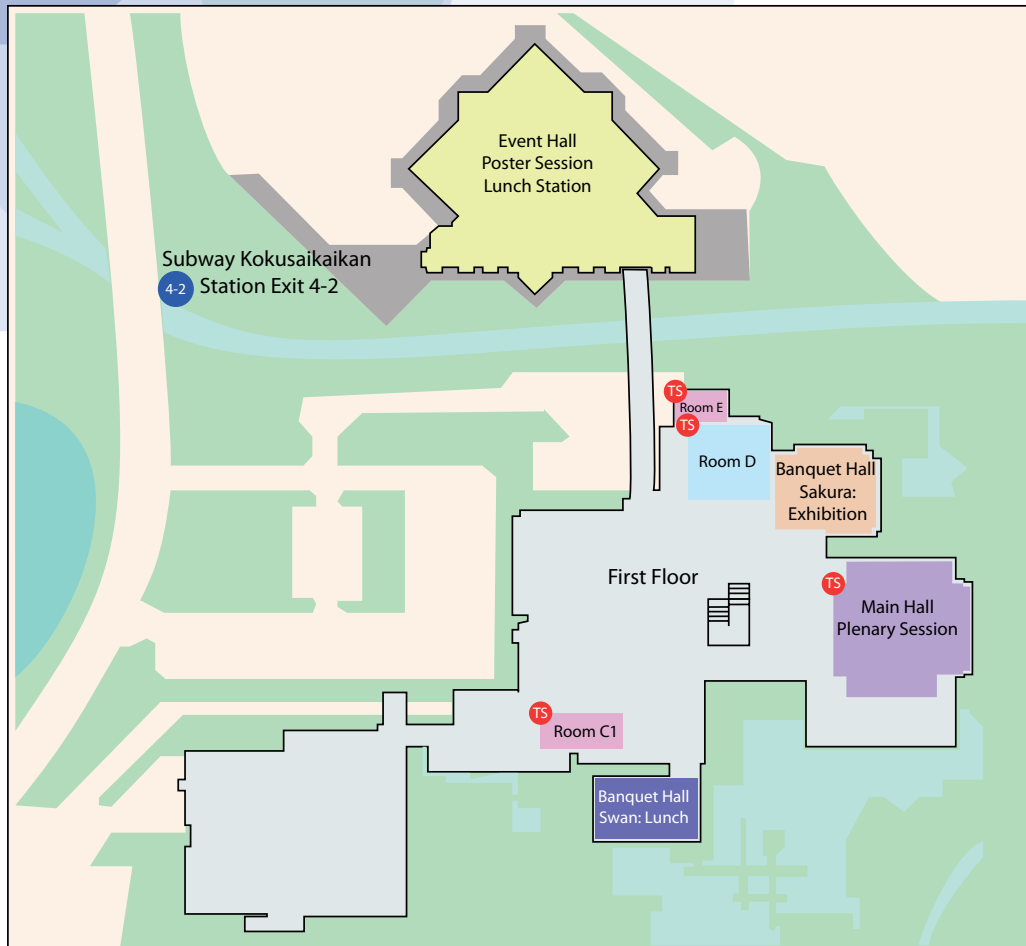
- E-01 Central Research Institute of Electric Power Industry (CRIEPI)
- E-02 Japan CCS Co., Ltd.
- E-03 KOREA ELECTRIC POWER CORPORATION (KEPCO)
- E-04 CO₂ Capture Project
- E-05 New Energy and Industrial Technology Development Organization (NEDO)
- E-06 Greenhouse Gases: Science and Technology
- E-07 CARBON MANAGEMENT CENTER (CMC)
- E-08 VATTENFALL
- E-09 International Institute for Carbon-Neutral Energy Research (I²CNER), Kyushu University
- E-10 Petroleum Technology Research Centre
- E-11 Nordic CCS Competence Centre NORDICCS / International CCS Research Centre BIGCCS



Conference Floorplan and Room Details

The GHGT-11 conference will utilise 7 different rooms for the parallel streams of the technical sessions, and the layout of the Kyoto international Conference Center can be seen on the maps below.

TS Indicates the location of Technical Sessions



Stream A	Main Hall, First Floor
Stream B	Room A, Second Floor
Stream C	Room B-1, Second Floor
Stream D	Room D, First Floor
Stream E	Room B-2, Second Floor
Stream F	Room C1, First Floor
Stream G	Room E, First Floor

Room K is the PC Preview Centre, where oral paper presenters can upload their presentations

Oral Session Details

Technical Session 1

Session 1A - Storage Capacity

Session Chairs: Sally Benson & Zique Xue

Estimating the Supply and Demand for Deep Geologic CO₂ Storage Capacity Over the Course of the 21st Century: A Meta-Analysis of the Literature
James Dooley, Joint Global Change Research Institute; Pacific Northwest National Laboratory

Comprehensive Assessment of Offshore Storage Options in The Netherlands
Filip Neele, Cor Hofstee, Rob Arts, Vincent, Vandeeweyer, Manuel Nepveu, Johan ten Veen, Frank Wilschut, TNO

Illustrating the Estimation of CO₂ Storage Capacity for a Hypothetical Injection Site
Guy Allinson, Wanwan Hou, Peter Neal, CO2CRC and University of New South Wales; John Kaldi, CO2CRC and University of Adelaide; Lincoln Paterson, CO2CRC and CSIRO

CCU&S via Stacked Storage—Case Studies from CO2EOR Basins of the United States
Susan Hovorka, David Carr, Stuart Coleman, Khandaka Zahid, Gordon Smith, Rebecca Smyth, Lesli Wood, The University of Texas at Austin

Session 1B - Post - Combustion: Solvent Pilots

Session Chairs: Prachi Singh & Takayuki Higashii

Solvent Development in Post Combustion CO₂ Capture-Selection Criteria and Optimization of Solvent Performance and Environmental Impact
Karl Anders Hoff, Eirik Falck da Silva, Inna Kim, Andreas Grimstvedt, SINTEF

A Guide to Evaluate Solvents and Processes for Post-Combustion CO₂ Capture
Paul Mathias, Satish Reddy, Arnold Smith, Kash Afshar, Fluor Corporation

Advances in Development of CO₂ Capture Solvent
Paul-Emmanuel Just, Cansolv Technologies Inc

Pilot Plant Results with Piperazine
Eric Chen, Tarun Madan, Paul Nielsen, Darschan Sachde, Lynn Li, Gary T. Rochelle, The University of Texas at Austin

Session 1C - Negative CO₂

Session Chairs: Debo Adams

Global Potential for Biogas Production with CCS
Joris Koorneef, Pieter van Breevoort, Paul Noothout, Chris Hendriks, Luchien Luning, Ecofys; Ameena Camps, IEAGHG

The Techno-Economic Potential of Integrated Gasification Co-Generation Facilities with CCS, Going from Coal to Biomass
Hans Meerman, Andrea Ramirez, Wim Turkenburg, Andre Faaij, Utrecht University

Incentivising BECCS in Indonesia
Florian Kraxner, Sabine Fuss, International Institute for Applied Systems Analysis; Wolfgang Heidug, International Energy Agency

Outdoor Prototype Results for Direct Atmospheric Capture of Carbon Dioxide
Geoffrey Holmes, Kenton Heide, Matthew Henderson, Paul Klavins, Kevin Nold, Arvinder Singh, David Keith, Carbon Engineering

Session 1D - Technology Assessment I: Cost and Risk

Session Chairs: Kevin McCauley & Howard Herzog

Risk Assessment and Management for CO₂ Capture and Transport Facilities
Angunn Engebø, Jens Garstad, Hamish Holt, Nada Ahmed, DNV

Techno-Economics of CCS in Oil Sands Thermal Bitumen Extraction: Comparison of CO₂ Capture Integration Options
Irene Bolea, CIRCE; Guillermo Ordorica-Garcia, Mehr Nikko, Alberta Innovates - Technology Futures; Michiel Carbo, Energy Research Centre of the Netherlands

Examining CCS Deployment Potential in China via Application of an Integrated CCS Cost Curve
Robert Dahowski, Casie Davidson, Pacific Northwest National Laboratory; Xiaochun Li, Ning Wei, Chinese Academy of Sciences

Potential Cost of Leakage from Geologic Sequestration in the Michigan Basin
Melisa Pollak, Jeffrey Bielicki, Elizabeth Wilson, University of Minnesota; Catherine Peters, Princeton University; Jeffery Fitts, Brookhaven National Lab

Session 1E - Techno-Economic Comparisons

Session Chairs: Jay Braitsch & John Davison

Post Combustion Capture on Natural Gas Combined Cycle Plants: A Technical and Economic Evaluation of Retrofit, New Build and the Application of Exhaust Gas Recycle
Desmond Dillion, EPRI

Performance and Costs of CO₂ Capture at Gas Fired Power Plants

Neil Smith, Geoff Miller, Richard Gadsden, Indran Aandi, Parsons Brinckerhoff Ltd; John Davison, IEAGHG

Integrated Techno-Economic and Environmental Assessments of Amine-Based Capture for Different CO₂ Concentration Gases

Xiangping Zhang, Norwegian University of Science and Technology; Amy Brunsvold, Erik Hognes, Jana Jokobsen, Simon Roussanally, SINTEF Energy Research

Comparison of Costs for Natural Gas Power Generation with CO₂ Capture

Philippe Mathieu, Olav Bolland, NTNU

Session 1F - Wellbore Integrity

Session Chairs: Stefan Bachu & Samantha Neades

Pre-Injection Baseline Data Collection to Establish Existing Wellbore Leakage Properties

Andrew Duguid, Robert Busch, Schlumberger Carbon Services; William Carey, Los Alamos National Laboratory; Michael A. Celia, James Wang, Princeton University; Nikita Chugunov, T.S. Ramakrishnan, Schlumberger-Doll Research; Viki Stamp, True Oil LLC; Sarah Gasda, Integrated Petroleum Research, Uni Research

Cement Sheath Integrity for CO₂ Storage – An Integrated Perspective

Axel-Pierre Bois, CurisTec; Siavash Ghabezloo, Jean Sulem, Ecole des Ponts; Manh-Huyen Vu, André Garnier, Jean-Benoît Laudet, Total

Geomechanical Behavior of Wells in Geologic Sequestration

William Carey, George Zyvoloski, Kayla Lewis, Sharad Kelkar, Los Alamos National Laboratory

Development of Reacted Channel during flow of CO₂-Rich Water along a Cement Fracture

Nicolas Huerta, The University of Texas at Austin and National Energy Technology Laboratory; Quinn Wenning, Marc Hesse, Christina Lopano, The University of Texas at Austin; Brian Strazisar, National Energy Technology Laboratory

Session 1G - Industrial Sources

Session Chairs: Stanley Santos & Eemeli Tsupari

Outline of Course 50

Shigeaki Tonomura, Nippon Steel & Sumitomo Metal Corporation

Application of Advanced Technologies for CO₂ Capture from Industrial Sources

Matteo Carmelo Romano, Politecnico di Milano; Rahul Anantharaman, SINTEF Energy Research; Antti Arasto, VTT; Hyungwoong Ahn, Maria-Chiara Ferarri, Imp-See, University of Edinburgh; Jan Wilco Dijkstra, ECN; Dulce Boavida, LNEG - Laboratório Nacional de Energia e Geologia

Techno-Economic Study of an Integrated Steelwork Equipped with Oxygen Blast Furnace (OBF) and CO₂ Capture

Lawrence Hooey, Swerea MEFOS; Andrew Tobiesen, SINTEF; Jeremy Johns, Tata Steel UK Consulting Ltd; Stanley Santos, IEAGHG

Temperature Dependence of Heat Integration Possibilities of an MEA Scrubber Plant at a Refinery

Viktor Andersson, Thore Bersntsson, Chalmers University of Technology; Per-Åke Franck, CIT Industriell Energi

Technical Session 2

Session 2A - CO₂ Injectivity

Session Chairs: Charles Gorecki & Karsten Michael

Snohvit CO₂ Storage Project: Assessment of CO₂ Injection Performance through History Matching of the Injection Well Pressure over a 32-Month Period

Ji Quan Shi, Claire Imrie, Caglar Sinayuc, Sevkett Durucan, Anna Korre, Imperial College; Ola Eiken, Statoil

Experimental and Numerical Study of the Effects of Halite Scaling on Injectivity and Seal Performance during CO₂ Injection in Saline Aquifers

Giacomo Bacci, Anna Korre, Sevkett Durucan, Imperial College London

A New Tool to Predict Injection Well Numbers for a Total Injection Rate and Given Formation Properties

Ehsan Azizi, Yildiray Cinar, Guy Allison, The University of New South Wales and CO2CRC, Karsten Michael, CO2CRC and CSIRO

Can We Overcome Thermo-Elastic Limits on CO₂ Injection Rates in Horizontal Wells?

Zhiyuan Luo, Steven Bryant, The University of Texas at Austin

Session 2B - Post-Combustion: Solvent Alternatives

Session Chairs: Peter Ragden & Bernd Schallert

Amine Blends Using Concentrated Piperazine

Le Li, Xe Chen, Yang Du, Stephanie Freeman, Okmar Namjoshi, Thu Nguyen, Alexander Voice, Qing Xu, Gary Rochelle, University of Texas at Austin; Han Li, Tsinghua University

Energy Efficient Solvents for CO₂ Absorption from Flue Gas: Vapour Liquid Equilibrium and Pilot Plant Study

Prachi Singh, IEAGHG; W. P. M. Van Swaaij, Wim Brillman, University of Twente

A Novel Reactive 4-Diethylamino-2-Butanol Solvent for Capturing CO₂ in the Aspect of Absorption Capacity, Cyclic Capacity, Mass Transfer, and Reaction Kinetics

Paitoon Tontiwachwuthikul, Zhiwu Liang, Raphael Idem, University of Regina and Hunan University; Teerawat Sema, Abdulaziz Naami, University of Regina, Canada

Amino Acids Salts for CO₂ Capture at Flue Gas Temperatures

Steven Chiao-Chien Wei, Graeme Puxty, Paul Feron, CSIRO Energy Technology

Session 2C - Demonstration Projects: Storage

Session Chairs: Sue Havorka & Ryoza Tanaka

CCS Large-Scale Demonstration in Japan

Masanori Abe, Shigeru Saito, Daiji Tanase, Yoshihiro Sawada, Yoshio Hiram, Yoshihiko Motoyama, Japan CCS Co., Ltd.

The In Salah CO₂ Storage Project: Lessons Learned and Knowledge Transfer

Philip Ringrose, Statoil ASA; Allan S. Mathieson, Iain Wright, BP Alternative Energy; Faycal Selama, In Salah Gas

Gorgon CO₂ Injection Project - 2012 Update

John Frontczak, Gorgon Project

CO₂ Storage in the Depleted P18-4 Gas Field Offshore the Netherlands (the ROAD project)

Rob Arts, Cor Hofstee, Vincent Vandeweyer, Maarten Pluymaekers, Daniel Loeve, TNO; Andreas Kopp, E.ON Gas Storage GmbH; Willem-Jan Plug, TAQA Energy BV

Session 2D - Technology Assessment II: Operational Flexibility

Session Chairs: Jim Dooley & Angunn Engebø

Operating Flexibility of Power Plants with CCS

Luca Mancuso, Rosa Domenichini, Noemi Ferrari Foster Wheeler; John Davison, IEAGHG

CO₂ Sequestration at Material Rates: Inherent Limits and Engineering Solutions

Steven Bryant, The University of Texas at Austin

Optimal CO₂ Capture Operation in an Advanced Electric Grid

Stuart Cohen, Michael Webber, Gary Rochelle, The University of Texas at Austin

Composing the Whole CCS System Including CO₂ Buffer

Haruhiro Suzuki, Kyuro Sasaki, Yuichi Sugai, Kyushu University

Session 2E - Membranes

Session Chairs: Teruhiko Kai & May-Britt Hägg

CO₂ Capture by Sub-Ambient Membrane Operation

David Hasse, Sudhir Kulkarni, Ed Sanders, Elizabeth Corson, Air Liquide Delaware Research & Technology Center; Jean-Pierre Tranier, Air Liquide R&D-Centre de Recherche Claude Delorme

Theoretical and Experimental Investigations of N₂-Selective Membranes

Jennifer Wilcox, Ekin Ozdogan, Panithita Rochana, Stanford University

Poly (Amidoamine) Dendrimer Containing Polymeric Membrane for Preferential CO₂ Separation over H₂ - Interplay Between CO₂ Separation Properties and Morphology

Ikuo Taniguchi, Teruhiko Kai, Shuhong, Dua, Shingo Kazama, Research Institute of Innovative Technology for the Earth

Pd-Membranes on Their Way Towards Application for CO₂ Capture

Frans van Berkel, Daniel Jansen, ECN; Andreas Goldbach, Hengyong Xu, DCIP; Chunhai Jiang, Chuanyong Hao, IMR; John Morund, SINTEF; Etienne Soutif, TECHNIP; Bai Song, BP

Session 2F - Modelling: Nanoscale to Core Scale

Session Chairs: Anna Korre & Andrew Cavanagh

Nanosized CO₂ Droplets Injection for Stable Geological Storage

Suguru Uemura, Yohei Matsui, Atsuto Noda, Shohji Tsushima, Shuichiro Hirai, Tokyo Institute of Technology

Molecular Dynamics Simulations of the CO₂/Water/Silica Wettability at Different Pressures

Shinya Tsuji, Makoto Kunieda, Yungfeng Liang, Toshifumi Matsuoka, Kyoto University; Satoru Takahashi, Japan Oil, Gas and Metals National Corporation (JOGMEC)

Pore Scale Models for Imbibition of CO₂ Analogue Fluids in Etched Micro-Model Junctions using Micro-Fluidic Experiments and Direct Flow Calculations

Edo Boek, Emily Chapman, Jianhui Yang, John Cranshaw, Imperial College London

Prediction of CO₂-Brine-Quartz Contact Angles with Molecular Dynamics Computations

Stefan Iglauder, Curtin University; Manu Matthews, Fernando Bresme, Imperial College London

Session 2G - Industrial Sources

Session Chair: Wilfred Maas

Aqueous Ammonia Capture Integrated with Ex-Situ Mineralisation using Recyclable Salts for Industrial CCS

Xiaolong Wang China Huaneng Clean Energy Research Institute; Mercedes Maroto-Valer, University of Nottingham

The Calcium Looping Process for Low CO₂ Emission Cement and Power

Matteo Carmelo Romano, Maurizio Spinelle, Stefano Campanari, Stefano Consonni, Politecnico di Milano; Giovanni Ciniti, Maurizio Marchi, Natale Pimpinelli, CTG - Italcementi Group

CO₂ Recovery from Industrial Hydrogen Facilities and Steel Production to Comply with European Emission Regulations:

Bernd Holling, Christine Kandziora, Alfred Bolkart, Linde AG

Oxy-Fuel Retrofitting of Fuel Oil Fired Refinery Heaters – a Two-Step Experimental Approach

Morten Seljeskog, Mario Ditaranto, SINTEF Energy Research

Technical Session 3

Session 3A - Environmental Impacts of CO₂ Storage

Session Chairs: Jun Kita & Tim Hill

Evaluation of Dissolved CO₂-Induced Metals Mobilization in Groundwater using a Controlled Release Experiment

Robert Trautz, EPRI; Liange Zheng, Yuxin Wu, Charuleka Varadharajan, Nicolas Spycher, Susan Hubbard, Jens Birkholzer, Lawrence Berkeley National Laboratory; John Pugh, Southern Company Services; Dennis Newell, Los Alamos National Laboratory

Laboratory Experiments and Field-Study of a Marine Natural Analogue for Potential Seepage from CO₂ Storage Sites in Aquatic Environments

Giorgio Caramann, Mercedes Maroto-Valer, The University of Nottingham

Potential Environmental Impacts of CO₂ Leakage from Study of Natural Analogue Sites in Europe

Fotini Ziogou, Vasiliki Gemen, Nikolaos Koukoulas; Hellas Institute; Davide de Angelis, Simone Libertini, Stan Beaubien, Salvatore Lombardi, Università di Roma 'La Sapienza'; Julie West, David Jones, Patricia Coombs, T.S. Barlow, British Geological Survey; M. Kruger, Bundesanstalt für Geowissenschaften und Rohstoffe

A Novel Experimental Release of CO₂ in the Marine Environment to Aid Monitoring and Impact Assessment

Jerry Blackford, Plymouth Marine Laboratory

Session 3B - Post-Combustion: Two-Phase Solvents

Session Chairs: Jasmin Kemper & Masaki Iijima

Selection and Characterization of Phase-Change Solvent for CO₂ Capture: Precipitating System

Inna Kim, Sholeh Ma'mum, SINTEF Materials and Chemistry

Overall Process Analysis and Optimization for CO₂ Capture from Coal Fired Power Plants Based on Phase Change Solvents Forming Two Liquid Phases

Ulrich Liebenthal, Alfons Kather, Hamburg University of Technology; Diego Pinto, Julianna Monteiro, Hallvard Svendsen, Norwegian University of Science and Technology

Precipitating Carbonate Solvent Process for CO₂ Capture

Geoff Stevens, Kathryn Mumford, Kohei Endo, Dimple Quyn, Hendy Thee, Kathryn Smith, Sandra Kentish, University of Melbourne; Clare Anderson, Barry Hooper, Abdul Qadar, CO2CRC

Precipitating Carbonate Process for Low-Energy Post-Combustion CO₂ Capture Technology Development and Pilot-Plant Operation

Robert Moene, Lodi Schoon, Frank Geuzenbroek, Shell Global Solutions International B.V.; Jiri van Streel Shell (Petroleum Mining) Co. Ltd (NZ)

Session 3C - Demonstration Projects: US Regional Carbon Sequestration Partnerships

Session Chairs: John Litynski & Masanori Abe

Three Million Metric Ton Monitored Injection at the SECARB Cranfield Project - Project Update

Susan Hovorka, The University of Texas at Austin

Early Operational Experience at a One-Million Tonne CCS Demonstration Project, Decatur, Illinois, USA

Robert Finlay, Scott Frailey, Hannes Leetaru, Illinois State Geological Survey; Scott Marsteller, Schlumberger Carbon Services

Evaluating the Suitability for CO₂ Storage at the FutureGen 2.0 Site, Morgan County, Illinois, USA

Alain Bonneville, Tyler Gilmore, Vince Verneul, Delphine Appriou, Bruce Bjornstad, Jack Horner, Frank Spane, Battelle Pacific Northwest Laboratories; Mark Kelley, Jackie Gerst, Neeraj Gupta, Kaitlin McNeil, Mark Moody, FutureGen Industrial Alliance Inc.

Overview of the Bell Creek Combined CO₂ Storage and CO₂ Enhanced Oil Recovery Project

John Hamling, Charles Gorecki, Edward Steadman, John Harju, University of North Dakota EERC

Session 3D - Panel Discussion: CCS in Developing Asia

An overview of the Asian Development Bank's efforts to promote CCS in the PRC and Southeast Asia, as part of a comprehensive plan to promote clean energy deployment in the region. Highlighting the role of CCS within PRC's overall energy security and decarbonizing strategy, and presenting ADB's CCS project portfolio in PRC.

Chairman: Ashok Bhargava, Energy Division ADB

Panelists:

Annika Seiler, Finance Specialist, ADB
Pradeep Tharakan, Climate Change Specialist, ADB
Tong Yiyang, Datang International Power Generation Corporation Limited,
Usman Pasara, LEMIGAS,
Witsarut Thungsuntonkhun, Dept of Mineral and Fuels, Thailand,
Le Van Luc, Ministry of Industry and Trade, Vietnam

Session 3E - Enhanced Hydrocarbon Recovery I

Session Chairs: Sandeep Verma & Kozo Sato

Flue Gas Injection for CO₂ Storage and Enhanced Coalbed Methane Recovery: Mixed Gas Sorption and Swelling Characteristics of Coals

Amer Syed, Sevkett Durucan, Ji-Quan Shi, Anna Korre, Imperial College London

Description of a CO₂ Enhanced Coalbed Methane Field Trial Using a Multi-Lateral Horizontal Well

Luke Connell, Zhejun Pan, Michael Camilleri, David Down, John Carras, Cameron Briggs, CSIRO; Shangzhi Meng, Wenzhong Zhang, Benguang Guo, CUCBM

The Altmark Natural Gas Field is Prepared for the Enhanced Gas Recovery Pilot Test with CO₂

Michael Kühn, Andrea Förster, Peter Pilz, Maja Tesmer, GFZ German Research Centre for Geosciences; Jochen Grossman, GICON Grossmann Ingenieur Consult GmbH; Jan Lille, GDF SUEZ E&P Deutschland GmbH; Kurt M. Reinicke, Technische Universität Clausthal; Dirk Schäfer, Christian-Albrechts-Universität Kiel

CO₂ Enhanced Oil Recovery and Geological Sequestration Potential in Northern Niagaran Pinnacle Reef Trend Reservoirs, Northern Lower Michigan, USA

David Barnes, William Harrison, Jason Asmus, Western Michigan University; G. Michael Grammer, Oklahoma State University

Session 3F - Modelling: Managing Uncertainty

Session Chairs: Bill Carey & Lingli Wei

Reducing Uncertainty in Reservoir Model

Predictions: From Plume Evolution to Tool Responses

Nikita Chugunov, T.S. Ramakrishnan, Schlumberger-Doll Research; Ozgur Senel, Schlumberger Carbon Services

Model Comparison and Uncertainty Quantification for Geologic Carbon Storage: The Sim-SEQ Initiative

Sumit Mukhopadhyay, Christine Doughty, Jens Birkholzer, Lawrence Berkeley National Laboratory; Jean-Philippe Nicot, Seyyed Hoseini, University of Texas Austin; Diana Bacon, Luke Gosink, Guang Lin, Ramya Ramanathan, Pacific Northwest National Laboratory; Sarah Gasda, Uni Research Norway

Capacity and Injectivity in the Surat/Bowen Basins, Queensland, Australia: Likelihood and Uncertainty Evaluation

Suzanne Hurter, Peter Probst, Sebastian Gonzalez, Sam Guiton, Schlumberger Carbon Services; Andrew Garnet, Formerly CEO & Project Director ZeroGen; Norhafiz Marmin, Schlumberger Carbon Services, Australia and Petroleum Development Oman

Maximum Uncertainty Reduction in Numerical Performance Assessments of Geological CO₂ Storage Sites: An Example from the Rock Springs Uplift, Greater Green River Basin, Wyoming, USA

Ronald Surdam, Zunsheng Jiao, Yuri Ganshin, Ramsey Bentley, Mario Garcia-Gonzalez, Scott Quillinan, Fred McLaughlin, University of Wyoming Carbon Management Institute; Philip Stauffer, Hailin Deng, Los Alamos National Laboratory

Session 3G - Commercial Issues

Session Chairs: Tony Boorer & Richard Esposito

The Implications of the Global Financial Crisis for CCS

Geoff Rumble, Christopher Short, Klaas van Alphen, Gwendaline Jossec, Global CCS Institute

North West Redwater Partnership – Carbon Capture through Innovative Commercial Structuring in the Canadian Oil Sands

Terry Kemp, Kevin Heal, North West Redwater Partnership

A Real Options Analysis of Carbon Dioxide Sequestration for Trinidad and Tobago: A Case Study of the Mahogany Field

Steve Seetahal, David Alexander, The University of Trinidad and Tobago

Value Chain Analysis of CO₂ Storage by Using the ECCOTool: Storage Economics

Daniel Loeve, Christian Bos, Alin Chitu, TNO; Sigurd Weidemann Løvseth, Per Eilif Wahl, SINTEF; Paula Coussy, IFPEN; Charles Eickhoff, Progressive Energy Ltd 4A Experiences and Case Studies

Technical Session 4

Session 4A - Experiences and Case Studies

Session Chairs: Andy Chadwick & John Kaldi

Snøhvit: The History of Injecting and Storing 1 Mt CO₂ in the Fluvial Tubåen Fm

Ola Eiken, Douglas Gilding, Hilde Hansen, Olav Hansen, Bamshad Nazarian, Bård Osdal, Philip Ringrose, Hossein Mehdi Zadeh, Statoil

Calibration and Prediction of the Sleipner CO₂ Plume from 2006 to 2012

Andrew Cavanagh, Landmark-Halliburton

Investigations of Alleged CO₂ Leakage in Weyburn, Canada in the Context of Longer Term Surface Gas Monitoring

David Jones, Andrew Barkwith, Tom Barloe, Bob Lister, British Geological Survey; Stan Beaubien, Tiziana Bellomo, Aldo Annunziatellis, Stefano Graziani, Salvatore Iombardi, Gilles Braibant, Università di Roma 'La Sapienza'

Inducing a CO₂ Leak into a Shallow Aquifer (CO₂FieldLab EUROGIA+ Project): Monitoring the CO₂ Plume in Groundwaters

Frédéric Gal, Eric Proust, Pauline Humez, Gilles Braibant, Michael Brach, Florian Kock, David Widory, Jean-François Girard, BRGM

Sessions 4B - Post-Combustion: Environmental Characterisation

Session Chairs: Phil Sharman & Yuichi Fujioka

Chemical Characterization of 30% MEA Degradation During Post-Combustion Capture of CO₂ from a Brown Coal-Fired Power Station

Alicia Reynolds, Vincent Verheyen, Samuel Adeboju, Alan Chafee, Monash University; Erik Meuleman, Paul Feron, CSIRO Energy Technology

Assessing Atmospheric Emissions from Amine-Based PCC Processes and Their Impacts on the Environment - A Case Study

Paul Feron, Merched Azzizi, Erik Meuleman, Brendan Halliburton, Dennys Angrove, CSIRO; Martin Oettinger, Global CCS Institute

Thermal Degradation on Already Oxidatively Degraded Solutions:

Solrun Johanne Velvestad, Hanna Knuutila, Hallvard Svendsen, NTNU; Andreas Grimstvedt, SINTEF Materials and Chemistry

Oxidative Degradation of Amines with High-Temperature Cycling

Alexander Voice, University of Texas and TNO; Fred Closmann, Gary Rochelle, University of Texas

Session 4C - Demonstration Projects: Policy Related Issues

Session Chairs: Brendan Beck & Chris Hendriks

Too Early or Too Late for CCS - What Needs to be Done to Overcome the Valley of Death for Carbon Capture and Storage in Europe?

Peter Radgen, E.ON New Build and Technology GmbH; Robin Irons, E.ON New Build and Technology Ltd.; Hans Schoenmakers, E.ON Benelux Holding B.V.

Key Messages from Active CO₂ Storage Sites

Ton Wildenborg, TNO; Andy Chadwick, BGS; Heleen de Coninck, ECN; Jean-Pierre Deflandre, IFPEN; Allan Mathieson, BP; Richard Metcalfe, Quintessa; Conny Schmidt-Hatteberger, GFZ

Establishment of Knowledge Base for Emission Regulation for the CO₂ Technology Centre Mongstad

Yolandi Maree, Sissel Nepstad, TCM DA; Gelin De Koeijer, Statoil

Industry Guidance on Safe Handling of CCS CO₂ - CO2RISKMAN JIP

Hamish Holt, Kaare Helle, Jorg Aarnes, DNV

25

Session 4D - Panel Discussion: Understanding the Costs of CCS

The literature reports a wide range of costs for CCS. Furthermore, these costs are reported in various forms, such as capture cost, avoided cost, levelized cost, etc. This can lead to confusion and misuse of the costing data. To help provide clarity to this subject, this panel will address several critical questions about CCS costs, including understanding costing methodologies, comparing real project costs to generic cost studies, and examining “first-of-a-kind” costs.

Chairman: Howard Herzog MIT

Panelists:

Chris Short, Global CCS Institute

Chris Greig, University of Queensland

Cheryl Wilson, Bloomberg

Session 4E - Enhanced Hydrocarbon Recovery II

Session Chairs: Kozo Sato & Steve Whittaker

Deploying Combined EOR and CCS Projects

Kurt House, Ernst van Neiro, Antonio Baclic, Shipeng Fu, Mark Henly, Charles Brankman, Kelly Bergman, Robert Selover, C12 Energy

Comparing Alternatives for Early CCS Projects in the United States via EOR

Eric Larson, Robert Williams, Princeton University; Guangjiang Liu, North China Electric Power University

Assessment of Factors Influencing CO₂ Storage Capacity and Injectivity in Eastern U.S. Gas Shales

Michael Godec, George Koperna, Robin Petrusak, Anne Oudinot, ARI Inc.

The Economics of CO₂ Sequestration Through Enhanced Oil Recovery

Klaas van 't Veld, Charles Mason, University of Wyoming; Andrew Leach, University of Alberta

Session 4F - Monitoring: Pressure Methods

Session Chairs: Millie Basava-Reddi & Randy Locke

Tracing Back the Pressure-Impact Zone of the CO₂ Geological Storage Through a Cyclic Injection Strategy

Jeremy Rohmer, BRGM

Leakage Fingerprints During Storage: Modeling Above-Zone Measurements of Pressure and Temperature

Qing Tao, Steven Bryant, Timothy Meckel, The University of Texas at Austin

Maximizing the Value of Pressure Monitoring Data from CO₂ Sequestration Projects

Srikanta Mishra, Mark Kelley, Evan Zeller, Nick Slee, Neeraj Gupta, Battelle Memorial Institute; Indra Bhattacharya, Mike Hammond, American Electric Power

Identifying Diagnostics for Reservoir Structure and CO₂ Plume Migration from Multilevel Pressure Measurements

Christin Strandli, Sally Benson, Stanford University

Session 4G - Retrofitting

Session Chairs: John Davison & Chris Satterley

Retrofitting CO₂ Capture to Existing Power Plants

Jon Gibbins, Hannah Chalmers, Mathieu Lucquiad, University of Edinburgh; John Davison, IEAGHG; Jia Li, Xi Liang, University of Exeter; Nial McGlashan, Imperial College London

Summary Results and Insight from EPRI's Engineering and Economic Study of Post Combustion Capture Retrofit Applied to Various North American Host Sites

Desmond Dillon, EPRI

Carbon Capture Retrofit Options with the On-Site Addition of Gas Turbine Combined Heat and Power Cycle

Mathieu Lucquiad, Maria Sanchez, Laura Herraiz, Jon Gibbins, The University of Edinburgh

Enhancement and Long-Term Testing of Optimized Post-Combustion Capture Technology – Results from the Second Phase of the Testing Programme at the Pilot Plant Niederaussem

Peter Moser, Sandra Schmidt, Sarah Wallus, RWE Power AG; Georg Sieder, Javier Garcia-Palacios, BASF SE; Torsten Stoffregen, Linde-Engineering Dresden GmbH, Dieter Mihailowitsch, Linde AG

Technical Session 5

Session 5A - Monitoring: Demonstration and Pilot Projects

Session Chairs: Toshifumi Matsuoka & Susan Hovorka

Microseismic Monitoring and Interpretation with Associated Injection Data from the In Salah CO₂ Storage Site (Krechba), Algeria

Volker Oye, Daniela Kühn, NORSAR; Eyvind Aker, Bahman Bohloili, Norwegian Geotechnical Institute; Thomas M. Daley, Valeri Korneev, Lawrence Berkeley National Laboratory

Feasibility of Time-Lapse Seismic Methodology for Monitoring Injection of Small Quantities of CO₂ into a Saline Formation, CO2CRC Otway Project

Roman Pevzner, Milovan Urošević, Eva Caspari, Mahair Maddi, Curtin University and CO2CRC; Tess Dance, Valeriya Shulakova, CSIRO; Boris Gurevich, Curtin University, CSIRO and CO2CRC; David Lumley, University of Western Australia; Vladimir Tcheverda, SB RAS; Yildiray Cinar, University of New South Wales and CO2CRC

Evaluation of CO₂ Saturation at Nagaoka Pilot-Scale Injection Site Derived from the Time-Lapse Well Logging Data

Takahiro Nakajima, Ziqiu Xue, Research Institute of Innovative Technology for the Earth

Assessment of Alleged CO₂ Leakage at the Kerr Farm Using a Simple Process-Based Soil Gas Technique: Implications for Carbon Capture, Utilization, and Storage (CCUS) Monitoring

Katherine Romanak, The University of Texas GCCC

Session 5B - Post-Combustion: Modelling

Session Chairs: John Topper & Hanne Kvamsdal

Dynamic Behaviour of the Solvent Regeneration Part of a CO₂ Capture Plant – Validation of the CO2SIM Model

Finn Andrew Tobiesen, Hanne Kvamsdal, Olaf Trygve Berglihn, Thor Mejdell, SINTEF Materials & Chemistry; Nina Enaasen, Magen Hillestad, NTNU

Rate-Based Modeling of CO₂ Capture Pilot Plant with Aqueous Monoethanolamine Solution

Chau-Chyun Chen, Ying Zhang, Aspen Technology, Inc.

Energy Performance of Advanced Stripper Configurations

Peter Frailie, Tarun Madan, Brent Sherman, Gary Rochelle, The University of Texas at Austin

Design Parameters Affecting the Commercial Post Combustion CO₂ Capture Plants

Ahmed Aboudheir, Walid Elmoudir, HTC CO₂ Systems Corp.

Session 5C - Demonstration Projects: Capture and Transport

Session Chair: Klaus Schöffel

The Alberta Carbon Trunk Line
Susan Cole, Enhance Energy Inc.

ELCOGAS Pre-Combustion Carbon Capture Pilot. Real Experience of Commercial Technology
Pedro Casero Cabezon, Francisco Garcia Peña, ELCOGAS, S.A.; Javier Trujillo Rivera, Universidad Castilla la Mancha

Oxy-Combustion Technology Development for Fluid Catalytic Crackers (FCC) – Large Pilot Scale Demonstration

Leonardo de Mello, Rodrigo Gobbo, Gustavo Moure, Petrobras; Ivano Miracca, ENI

30 MWth CIUDEN Oxy-CFB Boiler - First Experiences

Monica Lupion, Iñaki Alvarez, Pedro Otero, Vincente Cortes, CIUDEN; Reiji Kuivalainen, Jouni Lantto, Arto Hotta, Horst Hack, Foster Wheeler North America Corp.

Session 5D - Panel Discussion:

The Intersection of Large Scale Renewable Energy and CCS Deployment within the Electricity Sector

There is a growing body of literature that sees large scale renewable energy generation as a hindrance to the large scale deployment of CCS technologies, and suggests the deployment of renewable electricity generation will place additional burdens on CCS-enabled power plants, e.g., needing flexible CCS power plants to compensate for intermittency from large wind power farms. On the other hand, there is near unanimity that if climate goals such as not exceeding a change of more than 2°C this century, the scale of CCS deployment will be driven by our ability to grow hundreds of exajoules of bioenergy per year and use this bioenergy in dedicated BECCS power plants. This session is designed to examine from macroeconomic and engineering perspectives the ways in which large scale renewable energy and large scale CCS deployments can, and perhaps must, work together.

Chairman: Jim Dooley, PNNL, USA

Panelists:

Toshihiko Masui, NIES, Japan

Jae Edmonds, PNNL, USA

Sean McCoy, IEA-Paris, France

Howard Herzog, MIT, USA

Session 5E - Post-Combustion: Environmental Nitrosamines

Session Chairs: Paul Feron & Helle Brit Mostad

Nitrosamine Management in Aqueous Piperazine for CO₂ Capture

Nathan Fine, Gary Rochelle, Mandana Ashouripashaki, Alexander Voice, Steven Fulk, Lynn Li, Omar Namjoshi, University of Texas, Austin

Ultra-Violet Treatment as a Strategy for Destruction of Degradation Products from Amine Based Post Combustion CO₂ Capture

Moetaz Attalla, Phil Jackson, CSIRO

Destruction of Nitrosoamines with UV-Light
Hanna Knuutila, Hallvard Svendsen, Naveed Asif, NTNU

Health and Environmental Impact of Amine Based Post Combustion CO₂ Capture
Eik Gjernes, Laila Iren Helgesen, Gassnova SF; Sissel Nepstad, TCM DA

Session 5F - Reservoir Engineering: Multi-Phase Flow of CO₂ and Brine

Session Chairs: Steve Bryant & Pascal Audigane

Stability Analysis of CO₂-Brine Immiscible Displacement
Holger Ott, Steffan Berg, Shell Global Solutions International

Drainage and Imbibition CO₂/Brine Relative Permeability Curves at In-Situ Conditions for Sandstone Formations in Western Canada
Stefan Bachu, Alberta Innovates - Technology Futures

Multiphase Flow Properties of the CO₂/Brine System for Carbon Sequestration
Sam Krevor, Imperial College London; Ronny Pini, Sally Benson, Stanford University

Influence of Heterogeneity on Relative Permeability for CO₂/Brine: CT Observations and Numerical Modeling
Yi Zhang, Testuya Kogure, Shun Chiyonobu, Ziqiu Xue, RITE; Xinglin Lei, Geological Survey of Japan, National Institute of Advanced Industrial Science and Technology

Session 5G - Transport and Infrastructure

Session Chairs: Wolfgang Böser & Chris Hendriks

The Influence of Impurities, Material Development and Changing Prices on the Costs of CO₂ Transport
Marlinde Knoope, Andrea Ramírez, André Faaij, University Utrecht

Cost of CO₂ Transportation Infrastructures
Wim Mallon, Janneke van Wingerden, Han Lemmens, Luuk Buit, KEMA/Gasunie

Modelling Large-Scale CCS Development in Europe – Linking Techno-Economic Modelling to Transport and Storage Infrastructure
Jan Kjærstad, Mikael Odenberg, Filip Johnsson, Chalmers University of Technology; Joris Morbee, Evangelos Tzimas, European Commission

Economic CO₂ Network Optimization Model - COCATE European Project (2010-2013)
Paula Coussy, IFPEN Energies nouvelles; Simon Roussanal, SINTEF; Gaëlle Bureau-Cauchois, GEOGREEN; Ton Wildenborg, TNO

Technical Session 6

Session 6A - Site Characterisation and Selection

Session Chairs: Rajesh Pawar & Jonathan Pearce

CO₂ Storage Atlas of the Norwegian Part of the North Sea

Eva Halland, Wenche T. Johansen, Ine T. Gjeldvik, Fridtjof Riis, Christian Magnus, Van T.H. Pham, Inge M. Tappel, Norwegian Petroleum Directorate

Depositional Environment as an Indicator of Favorable Regional Sequestration Targets: Examples from the USGS CO₂ Storage Resource Assessment
Matthew Merrill, U.S. Geological Survey

Effects of Geological Heterogeneity on CO₂ Distribution and Migration – A Case Study from the Johansen FormaStion, Norway
Anja Sundal, Johan Petter Nystuen, Henning Dypvik, Per Aagaard, University of Oslo

Evaluation of CO₂ Storage Potential in the Skagerrak/Kattegat Area
Per Eirik Strand Bergmo, Szczepan Polak; SINTEF Petroleum Research, Per Aagaard, University of Oslo; Peter Frykman, Geological Survey of Denmark and Greenland; Hans Hasken Haugen, Dag Bjørnsen, Tel-Tek

Fault Stability Analysis Related to CO₂ Injection at Tomakomai, Hokkaido
Yuki Kano, Takahiro Funatsu, Shinsuke Nakao, Kinichiri Kusunose, Tsuneo Ishido, Xinglin Lei, Toshiyuki Tosha, Geological survey of Japan/AIST

Session 6B - Sorbent Systems

Session Chairs: Sven Unterberger & Mohammad Abu Zahra

Testing Post-Combustion CO₂ Capture with CaO in a 1.7 MWt Pilot Facility
Calros Adanades, Borja Arias, Spanish Research Council; CSIC-INCAR, Andrés Sánchez-Biezma, Jesús Paniagua, Endesa Generación; Luis Díaz, María Lorenzo, Grupo Hunosa, Javier Alvarez, Diego Martínez, Foster Wheeler Energía S.L.U

Progress in Calcium-Looping Post-Combustion CO₂ Capture: Successful Pilot Scale Demonstration
Heiko Dieter, Craig Hawthorn, Mariusz Zieba, Günter Scheffknecht, IFK University of Stuttgart

Assessment of Solid Sorbents as a Competitive Post-Combustion CO₂ Capture Technology
Justin Cole Gler, Edward Rubin, Carnegie Mellon University

Continuous CO₂ Capture from Flue Gases Using Dual Fluidized Bed Reactors with Supported Amine Sorbent

Zhen-shan Li, Wen-ying Zhao, Zhi Zhang, Li-xiang Wang, Ning-sheng Cai, Tsinghua University

The Role of Water in Adsorption-Based CO₂ Capture Systems

Dorian Marx, Lisa Joss, Max Hefti, Marco Mazzotti; ETH Zurich, Ronny Pini, Stanford University

Session 6C - Demonstration Projects: Post-Combustion Capture

Session Chairs: Howard Herzog & Richard Rhudy

Operational Experience and Initial Results from the First Test Period at the CO₂ Technology Centre Mongstad

Vibeke Andersson, Knut Sanden, Aker Clean Carbon; Kristina Wittmeyer, Yolandi Maree, TCM DA

Project Status and Research Plans of 500 TPD CO₂ Capture and Sequestration Demonstration at Alabama Power's Plant Barry

Michael Ivie, Nick Irvin, Chethan Acharya, Southern Company; Yasuo Kubota, Hiromitsu Nagayasu, Takuya Hirata, Paul Wood, Takahito Yonekawa, Tatsuya Tsujiuchi, MHI

Aqueous Ammonia Based Post-Combustion Capture: Results from Pilot Plant Operation, Challenges and Further Opportunities

Hai Yu, Paul Feron, CSIRO Energy Centre

Initial Results from Fluor's CO₂ Capture Demonstration Plant Using Econamine FG Plus Technology at E.ON Kraftwerke's Wilhelmshaven Power Plant

Satish Reddy, Jeff Scherffius, Fluor Corporation; Peter Ragden, Helmut Rode, E.ON New Build & Technology GmbH

CCPILOT100+ Operating Experience and Test Results

J. Carey, SSE, F.D. Fitzgerald, R.A Gardiner, Doosan Power Systems

Session 6D Panel Discussion: 24Mt of CO₂ and Counting: What Has Weyburn-Midale Taught Us About CCUS?

The Weyburn and Midale oilfields in southern Saskatchewan, Canada, now store approximately 24 million tonnes of anthropogenic CO₂ – making these CO₂-EOR operations the world's largest CCUS project and allowing the allied IEAGHG Weyburn-Midale CO₂ Monitoring and Storage Project to provide over a decade of world class applied scientific research. The panel session will highlight numerous technical achievements including the successful application of 3D seismic surveys, characterisation of the storage complex and adjacent environment to allow comprehensive risk assessment, and development of new tools to aid in the assessment of wellbore integrity. The session will also describe how the research project helped the unequivocal disproval of leakage allegations made against the Weyburn site in 2011.

Chairman: Malcolm Wilson, PTRC

Panel Members:

Neil Wildgust, PTRC
Ben Rostron, University of Alberta
Chris Hawkes, University of Saskatchewan
Jim Johnson, Schlumberger-Doll Research
Rick Chalaturnyk, University of Alberta
Don White, NRCan

Session 6E - Oxy-Combustion: Combustion Fundamentals

Session Chairs: Takashu Kiga & Monica Lupion

Sulfur Oxide Emissions Under Dust-Fired Oxy-Fuel Combustion of Coal

Reinhold Spörl, Jörg Maier, Günter Scheffknecht; Universität Stuttgart

Development of Hitachi Oxy-Fuel Combustion Technologies

Toshihiko Mine, Takahiro Marumoto, Kenji Kiyama, Noriyuki Imada, Ken-Ichi Ochi, Hideaki Iwamoto, Babcock-Hitachi K.K. Kure Research Laboratory

Fireside Corrosion of Applied and Modern Superheater-Alloys Under Oxyfuel Conditions

Gosia (Malgorzata) Stein-Brzozowska, Jörg Maier, Günter Scheffknecht, IFK University of Stuttgart; Danila Cumbo, Silvia Masci, Enrico Tosi, Enel Engineering and Innovation; Giovanni Coraggio, Marco Faleni, Leonardo Biasci, International Flame Research Foundation (IFRF)

Technology Assessment of Oxy-Firing of Process Heater Burners

Cliff Lowe, Nick Brancaccio, Chevron Energy Technology Company; Jamal Jamaluddin, Shell Projects and Technology; Charles Baukal, Erwin Platvoet, Jaime Erazo, John Zink Co.

Evaluation of the Performance of a Power Plant Boiler Firing Coal, Biomass and a Blend Under Oxy-Fuel Conditions as a CO₂ Capture Technique

Alessandro Pranzitelli, Sandy Black, Penelope Edge, Janos Szuhánszki, Lin Ma, Mohamed Pourkashanian, University of Leeds

Session 6F - Legal and Regulatory

Session Chairs: Tim Dixon & Juho Lipponen

Liability for Sequestered CO₂; The Path Forward for Alberta

Michael Fernandez, Alberta Energy

Regulating Carbon Dioxide Storage Operations Near Oil and Gas Fields, Australia's Approach

Ian Walker, Steve Tantala, Willie Senanayake, Department of Resources, Energy and Tourism, Australian Government; Greg Leamon, Geoscience Australia, Australian Government

Implications of Alternative Post-Injection Regulatory Guidance Upon CO₂ Storage in Dipping Open Aquifers

Aaron Goater, Andy Chadwick, British Geological Survey

Carbon Capture and Storage and the London Protocol: Recent Efforts to Enable Transboundary CO₂ Transfer

Justine Garrett, Sean McCoy, International Energy Agency

CCS Directive Transposition into National Laws in Europe: Progress and Problems by the End of 2011

Alla Shogenova, Kazbulat Shoganova, Tallinn University of Technology; Kris Piessens, Geological Survey of Belgium; Sam Holloway, BGS; Roberto Martínez, IGME; Kristin M. Flornes, IRIS; Niels E. Poulsen, Geological Survey of Denmark and Greenland; Adam Wójcicki, Polish Geological Institute; Anlexandra Dudu, GeoEcoMar; Sergio Persoglia, OGS

Session 6G - Transport and Infrastructure

Session Chairs: Jim Dooley & Joris Koornneef

Regional Specific Challenges of a CO₂ Pipeline Infrastructure in the West Mediterranean Area

Machteld van den Broek, Niels Berhout, Ramírez, Utrecht University; Paulo Mesquita, Júlio Carneiro, José Rafael Silva, University of Évora; João Pedro Gouveia, Júlia Seixas, Universidade Nova de Lisboa; Helena Cabal, CIEMAT; Roberto Martinez, IGME; Abdelkrim Rimi, ISR; Mariana Sardinha, Dulce Boavida, LNEG; GianCarlo Tosato, Asatrem srl

Flow Assurance CCS Project ROAD

Wolfgang Boeser, Stefan Belfroid, E.ON Ruhrgas AG

Integration of Pipeline Operations Sourced with CO₂ Captured at a Coal-Fired Power Plant and Injected for Geologic Storage: SECARB Phase III CCS Demonstration

Richard Esposito, Southern Company Generation; Christina Harvick, Rusty Shaw, Denbury Resources, Inc.; Doug Mooneyham, Cardno Entrix; Jerry Hill, Southern State Energy Board; Robert Trautz, EPRI

Planning CCS Development in the West Mediterranean

Dulce Boavida, Laboratório Nacional de Energia e Geologia - LNEG; Julio Carnerio, University of Évora; Roberto Martinez, IGME; Machteld van den Broek, Andrea Ramirez, Utrecht University; Abdelkrim Rimi, UM5A-ISR; Giancarlo Tosato, ASATREM; Marie Gastine, BRGM

The Study on Prospects and Early Opportunities for Carbon Capture and Storage in Guangdong Province, China

Ying Huang, Diaqing Zhao, Chinese Academy of Sciences; Hongxu Guo, Chinese Academy of Sciences and Graduate School of the Chinese Academy of Science

TechnicalSession 7

Session 7A - Trapping Mechanisms: Case Studies

Session Chairs: John Bradshaw & Charles Gorecki

Determining Residual CO₂ Saturation Through a Dissolution test - Results from a CO₂CRC Field Experiment

Ralf Haese, Chris Boreham, CO₂CRC/Geoscience; Jonathan Ennis-King, Lincoln Paterson, CO₂CRC/CSIRO; Barry Freifeld, Lawrence Berkeley National Laboratory; Ulrike Schacht, University of Adelaide

Brine Geochemistry Changes Induced by CO₂ Injection Observed Over a 10 Year Period in the Weyburn Reservoir

Maurice Shevalier, Michael Nightingale, Bernhard Mayer, Ian Hutcheon, University of Calgary

Assessment of the Contribution of CO₂ Trapping Mechanisms at the Ketzin Pilot Site

Thomas Kempka, Elisa Klein, Marco de Lucia, Elena Tillner, Michael Kühn, GFZ

Geochemical Trapping of CO₂ in Saline Aquifer Storage: Results of the Repeated Formation Fluid Sampling at the Nagaoka Site

Saeko Mito-Adachi, Ziqiu Xue, RITE

Session 7B - Post-Combustion: Environmental Aerosol

Session Chairs: Masami Onoda & Gary Rochelle

Emission Studies from a CO₂ Capture Pilot Plant

Eirik Falck da Silva, Herman Kolderup, Kai W. Hjarbo, Thor Mejdell, Kolbjørn Zahlsen, Hanne M. Kvamsdal, SINTEF Materials and Chemistry; Arjen Huizinga, Purvil Khakharia, Ilse Tuinman, TNO

Characterization of Piperazine/Aminomethylpropanol

Han Li, Jian Chen, Tsinghua University; Le Li, Thu Nguyen, Peter Frailie, Gary Rochelle, The University of Texas at Austin

Novel Concept for Emission Control in Post-Combustion Capture

Jacob Nygaard Knudsen, Otto Mort Bade, Marie Anheden, Oddvar Gorset, Randi Bjorklund, Aker Clean Carbon AS

Volatile Contaminant Control in Amine-Based CO₂ Capture Systems

Steven Fulk, Gary Rochelle, The University of Texas at Austin

Session 7C - System Integration I: Power Systems

Session Chairs: Kevin McCauley & Kenji Yamaji

The Flexibility Requirements for Power Plants with CCS in a Future Energy System with a Large Share of Intermittent Renewable Energy Sources

Anne Sjoerd Brouwer, Utrecht University and Energy Research Centre of the Netherlands; Ad Seebregts, Energy Research Centre of the Netherlands; André Faaij, Utrecht University

Integration and Operation of Post-Combustion Capture System of Coal-Fired Power Generation: Load Following and Solvent Storage

Robert Brasington, Howard Herzog, Massachusetts Institute of Technology

Performance and Cost Impacts of Cycling Coal and Natural Gas-Fired Power Plants with CCS in a System with High Wind Penetration

Peter Versteeg, David Luke Oates, Edward Rubin, Carnegie Mellon University

The Value of CCS in Power Systems with High Levels of Renewables Penetration

Sean McCoy, Dennis Volk, International Energy Agency; Joachim Bertsch, Stefan Nagl, Christian Growitsch, University of Cologne; Mathias Finkenrath, University of Applied Sciences Kempten; John Davison, IEAGHG

Session 7D - Panel Discussion: Making CCS Demonstrations Happen: Lessons Learned

Fossil fuels, both coal and gas, are expected to dominate in the world power generation mix for the next several decades. The IEA estimates that methods to deal with emissions from these sources should make up about one fifth of the effort required to meet the 2 degree Celsius goal for avoiding dangerous climate change. Worldwide, a number of institutions and technology suppliers have invested considerable money in research and development of capture and storage methods for CO₂. Some \$26 billion in support has been pledged by governments towards major demonstrations of the technology. Yet few of these demonstrations have gone ahead and, in the electricity sector, none are yet operational. What has gone wrong, and how can the situation be improved?

Chairman: Gwen Andrews, Alstom

Panel Members:

Tony Wood, Clinton Climate Foundation
Masanori Abe, Japan CCS Co.
Peter Radgen, E.ON
Greg Everett, Delta Energy

Session 7E - Capture Pre-Combustion: Process

Session Chairs: Olav Bolland & Daan Jansen

A Step-Change Sour Shift Process for Improving the Efficiency of IGCC with CCS

Jonathan Forsyth, BP Alternative Energy International Limited

Application of Hydrogen Selective Membranes to Integrated Gasifier Combined Cycle

Giampaolo Manzolini, Matteo Gazzani, Davide Turi, Antonio Giuffrida, Ennio Macchi, Politecnico di Milano

High Efficiency IGCC with Carbon Capture via Technology Improvements, Improved Heat Integration and Reuse of Low Grade Heat

Suzanne Ferguson, Geoff Skinner, Jaco Schieke, Foster Wheeler; Eva van Dorst, Shell Global Solutions International B.V.

Simulation of the Cyclic Operation of a PSA-based SEWGS Process for Hydrogen Production with CO₂ Capture

Bitan Najmi, Olav Bolland, Norwegian University of Science and Technology; Konrad Eichhorn Colombo, GE Global Research, Germany

Session 7F - Monitoring: Geochemical Methods

Session Chairs: Katherine Romanak & Linda Stalker

Strategies for Detection and Monitoring of CO₂ Leakage in Sub-Seabed CCS

Kiminori Shitashima, International Institute for Carbon-Neutral Energy Research, Kyushu University; Yosiaki Maeda, CERES, Inc; Takashi Ohsumi, Central Research Institute of Electric Power Industry

Development of an Offshore Monitoring Plan for a Commercial CO₂ Storage Pilot

Owain Tucker, Paul Garnham, Paul Wood, Shell Projects and Technology; Wilfred Berlang, Shell Projects and Technology

Design and Instrumentation of a High Controlled Experiment of CO₂ Injection at Heletz, Israel in the Frame of the EU-FP7 MUSTANG project

Jacob Bensabat, EWRE Ltd.; Auli Niemi, Uppsala University

Atmospheric Tomography as a Tool for Quantification of CO₂ Emissions from Potential Surface Leaks

Andrew Feitz, Tehani Kuske, Henry Berko, Geoscience Australia and CO2CRC; Charles Jenkins, CSIRO Energy Transformed Flagship; Steve Zegelin, CO2CRC and CSIRO Marine and Atmospheric Research; Mahabubur Mollah, Primary Industries Research Victoria

Session 7G - Policy: Emissions Trading

Session Chair: Ken-ichi Wada

Getting Science and Technology into International Climate Policy: Carbon Capture and Storage in the UNFCCC

Tim Dixon, Samantha Neades, IEAGHG; Katherine Romanak, Gulf Coast Carbon Center, Bureau of Economic Geology, The University of Texas at Austin; Andy Chadwick, British Geological Survey

CCS Projects as Kyoto Protocol CDM Activities

Greg Leamon, Australian Government; Tim Dixon, IEAGHG; Paul Zakkour, Carbon Counts; Luke Warren, Carbon Capture and Storage Association

CCS in Carbon Markets

Ellina Levina, Juho Lipponen, International Energy Agency

Deployment of CCS in Europe: an Assessment of the Effectiveness of the EU ETS

Arnold Mulder, University of Groningen

Technical Session 8

Session 8A - Risk Assessment and Management I

Session Chair: Kenneth Hnottavange-Telleen

Quantification of Risk Profiles and Impacts of Uncertainties as Part of US DOE's National Risk Assessment Partnership (NRAP)

Rajesh Pawar, Philip Staufer, Los Alamos National Laboratory; Grant Bromhal, Robert Dilmore, National Energy Technology Laboratory; Curt Oldenberg, Lawrence Berkeley National Laboratory; Bill Foxall, Edwin Jones, Lawrence Livermore National Laboratory; Stephen Unwin, Pacific Northwest National Laboratory

Quantifying Basin Scale Leakage Risk and Stakeholder Impacts

Jeffrey Bielicki, Melissa Pollak, Elizabeth Wilson, University of Minnesota; Catherine Peters, Jeffrey Fitts, Princeton University

Induced Seismicity; Observations, Risks and Mitigation Measures at CO₂ Storage Sites

Andy Nicol, Matt Gerstenberger, CO2CRC & GNS Science; Paul Viskovic, Chris Bromley, Susan Ellis, GNS Science; Charles Jenkins, CSIRO Canberra; Tony Siggins, CSIRO Melbourne

Key Site Abandonment Steps in CO₂ Storage

Michael Kühn, Mario Wipki, Stefan Lüth, GFZ German Research Centre for Geosciences; Sevet Durucan, Imperial College London; Jean-Pierre Deflandre, IFP Energies nouvelles; Jens Wollenweber, TNO - Nederlandse Organisatie voor; Andy Chadwick, British Geological Survey; Gualtiero Böhm, Istituto Nazionale di Oceanografia e Geofisica Sperimentale

Session 8B - Post-Combustion: Advanced Solvents

Session Chairs: Kazuya Goto & Gary Rochelle

Chemical Absorption Kinetics in MEA Solution with Fine Particles

Bo Zhao, Meng Cao, Shujuan Wang, Yuqun Zhuo, Changhe Chen, Key Laboratory for Thermal Science and Power Engineering of Ministry of Education

Optimization of CO₂ Capture from Flue Gas with Promoted Potassium Carbonate Solutions

Peter Behr, Andre Maun, Alexander Tunnat, Gerd Oeljeklaus, Randi Görner, University Duisburg-Essen

Alternative Layouts for the Carbon Capture with the Chilled Ammonia Process

Gianluca Valenti, Davide Bonalumi, Ennio Macchi, Dominicc Gatti, Politecnico di Milano; Philip Fosbøl, Kaj Thomsen, Technical University of Denmark

New Energy Efficient Processes and Newly Developed Absorbents for Flue Gas CO₂ Capture
Koji Kadono, Asao Suzuki, Kansai Electric Power;
Masaki Iljima, Toyishi Ohishi, Mitsubishi Heavy Industries; Hiroshi Tanaka, Takuya Hirata, Masami Kondo, Mitsubishi Heavy Industries

Session 8C - System Integration II: Infrastructure

Session Chairs: Keigo Akimoto & Angunn Engebø

Infrastructure for CCS in the Skagerrak/Kattegat Region, Southern Scandinavia: A Feasibility Study
Hans Askel Haugan, Nils Eldrup, Ragnhild Skagestad, Anette Mathisen, Dag Bjørnsen, Tel-Tek; Per Aagaard, Thor Axel Thorsen, University of Oslo; Jan Kjærstad, Chalmers University of Technology; Per Bergmo, SINTEF Petroleum Research

Pathways for Deploying CCS at Australian Power Plants

Minh Ho, Dianne Wiley, UNSW and CO2CRC

CCS Infrastructure Development Scenarios for the Integrated Iberian Peninsula and Morocco Energy System

Amit Kanudia, KanORS EMR, India; Dulce Boavida, INETI; Mactheld van den Broek, Utrecht University; Helena Cabal, CIEMAT; Maurizio Gargiulo, E4SMA srl; João Pedro Gouveia, CENSE; Maryse Labriet, ENERIS; Gian Carlo Tosato, ASATREM srl

Basin-Scale Impacts of Industrial-Scale CO₂ Injection on Petroleum and Groundwater Resources in the Gippsland Basin, Australia

Karsten Michael, Sunil Varma, CSIRO Earth Science & Resource Engineering; Elise Bekele, CSIRO Land & Water; Monica Campi, Geoff O'Brien, GeoScience Victoria, Department of Primary Industries

Session 8D - Panel Discussion: Storage Capacity – What Do We Know and What Has Changed?

This panel will discuss the critical issue of storage capacity. How to we define it? How do we know how much is available? What progress has been made in the past few years in refining global, regional and local estimates? In addition we will address important issues such as, how might pressure buildup limit storage capacity and how could this be managed; and to what extent microseismicity and associated changes to the seal constrain the locations where CO₂ is stored. Research leaders from around the world will provide a status report about these issues and insights about what more is needed to improve our confidence in storage capacity estimation.

Chairman: Sally Benson, Stanford University

Panelists:

Sam Holloway, BGS

Susan Hovorka, University of Texas at Austin

Sean Brennan, US Geological Survey

Stefan Bachu, Alberta Innovates - Technology Futures

Matt Gerstenberger, GNS Science

Session 8E - Novel Systems

Session Chairs: Katsunori Yogo & Rebecca Gardiner

Higher Efficiency and Lower Cost Electricity Generation from Fossil Fuels while Eliminating Atmospheric Emissions, Including Carbon Dioxide
Rodney Allam, Miles Palmer, G. William Brown, Jeremy Fetvedt, NET Power LLC; Hideo Nomoto, Nobuo Okita, Masao Itoh, Toshiba Corporation; Bo Jones, Shaw Power Group

Electrochemically-Mediated Gas Separation Processes for Carbon Abatement

Fritz Simeon, Mike Stern, Krisitn Vicari, Howard Herzog, T. Alan Hatton, Massachusetts Institute of Technology; Thomas Hammer, Harald Landed, Siemens Corporate Technology

Development of an Energy-Efficient CO₂ Capture Process using Thermomorphic Biphasic Solvents

Jiafei Zhang, Yu Qiao, Wanzhong Wang, Khuram Hussain, David Agar, Technical University of Dortmund

Low Temperature CO₂ Capture for Near-Term Applications

Nikolett Sipöcz, Alvaro Hernandez, Miguel A, Gonzalez-Salazar, GE Global Research; Roger Shisler, Vitali Lissianski, GE Global Research

Session 8F - Monitoring: Geophysical Imaging

Session Chairs: Pascal Audigane & Curtis Oldenburg

Geochemical Interactions Between CO₂ and Minerals within the Utsira Caprock: A 5-year Experimental Study

Keith Bateman, Christopher Rochelle, Gemma Purser, Simon Kemp, Doris Wagner, British Geological Survey

Geochemical Clogging in Fracture and Porous Rock for CO₂ Mineral Trapping

Seung Youl Yoo, Yoshitada Mito, Toshifumi Matsuoka, Kyoto University; Akira Ueda, University of Toyama

The Impact of Geomechanics on Monitoring Techniques for CO₂ Injection and Storage

Tom Lynch, Doug Angus, Quentin Fisher, Pirooska Lorinczi, University of Leeds

Changes in Pore Structure and Connectivity Induced CO₂ Injection in Carbonates: a Combined Pore-Scale Approach

Oussama Gharbi, Branko Bijeljic, Martin Blunt, Imperial College London; Edo Boek, Imperial College London

Session 8G - Education

Session Chairs: **Jurgen-Friedrich Hake & Malcolm Wilson**

Scope, Characteristics and Quality of Education Materials on CCS for the School Sector Around the World: Addressing and Trialling the Gaps

Anne-Maree Dowd, Talia Jeanneret; CSIRO

Creating a Sequestration Capacity Building and Knowledge Sharing Center

Sallie Greenberg, Illinois State Geological Survey

Developing National CCS Capacity and Skills: Examples from the UK

Robin Cathcart, Elizabeth Van der Meer, UK CCS Community Network; Hannah Chalmers, Jon Gibbins, UK CCS Community Network and University of Edinburgh; Colin Snape, University of Nottingham

China-Australia Capacity Building Program on the Geological Storage of Carbon Dioxide - Results from Phase I

Richard Causebrook, Aleksandra Kalinowski, Jessica Gurney, Liuqi Wang, Geoscience Australia; Jiutian Zhang, Jia Li, Administrative Centre for China's Agenda 21

TechnicalSession 9

Session 9A - Reservoir Engineering: Pressure Management

Session Chairs: **Chris Hawkes & Neil Wildgust**

An Integrated Economic and Engineering Assessment of Opportunities for CO₂ Injection with Water Production in the South-East Queensland, Australia

Peter Neal, Yildiray cinar, Guy Allinson, CO2CRC, Australia and School of Petroleum Engineering, The University of New South Wales

Four-Site Case Study of Water Extraction from Carbon Dioxide Storage Reservoirs

Guoxiang Liu, Charles Gorecki, Jordan Bremer, Ryan Klapperich, Robert Cowan, Yevhen Holubnyak, Damion Knudsen, Dayanand Saini, EERC

Dissipation of Overpressure into Ambient Rocks During CO₂ Storage

Kyung Won Chang, Marc Hesse, The University of Texas at Austin; Jean-Philippe Nicot, The University of Texas

Reservoir Management of CO₂ Injection: Pressure Control and Capacity Enhancement

Bramshad Nazarian, Rudolf Held, Lars Høier, Philip Ringrose, NTNU

Magnitude and Duration of Temperature Changes in Geological Storage of Carbon Dioxide

Tara LaForce, Jonathan Ennis-King, Lincoln Paterson, CO2CRC/CSIRO Earth Science and Resource Engineering

Session 9B - Chemical Looping

Session Chairs: **Olav Bolland & Jasmin Kemper**

10 MW CLC Field Pilot

Song P. Sit, Alex Reed, Cenovus Energy Inc.; Ulrich Hohenwarter, Viktoria Horn, Andritz Energy & Environment; Tobias Proll, Marx Klemens, Vienna University of Technology

Chemical-Looping Combustion of Solid Fuels – Operational Experiences in 100 kW Dual Circulating Fluidized Bed System

Anders Lyngfelt, Pontus Markström, Carl Linderholm, Chalmers University of Technology

Next Scale Chemical Looping Combustion: Process Integration and Part Load Investigation for a 10MW Demonstration Unit

David Riesterberg, Shawna Cyphers, Karine Schepers, Gero Koperna, BERTSCHenergy, Josef Bertsch Gesellschaft m.b.H. & Co. KG

Integration of Coal Gasification and Packed Bed CLC Process for High Efficiency and Near-Zero Emission Power Generation

Matteo Carmelo Romano, Paolo Chiesa, Vincenzo Spallina, Giovanni Lozza, Politecnico di Milano

Use of Chemical-Looping Processes for Coal Combustion with CO₂ Capture

Juan Adanez, Pilar Gayan, Iñaki Adanez-Rubio, Ana Cuadrat, Alberto Abad, Francisco Garcia-Labiano, Luis Francisco de Diego, Instituto de Carboquímica- CSIC

Session 9C - Policy: Other

Session Chairs: **Tim Dixon & Helle Brit Mostad**

Analysing Uncertainties for CCS: from Historical Analogues to Future Deployment Pathways in the UK

Jim Watson, University of Sussex; Florian Kern, Nils Markusson, Hannah Chalmers, Stuart Haszeldine, Jon Gibbins, Mark Winskel, University of Edinburgh; Rob Gross, Phil Heptonstall, Imperial College London; Peter Pearson, University of Cardiff

CCS, Nuclear Power and Biomass; an Assessment of Option Triangle under Global Warming Mitigation Policy by an Integrated Assessment Model MARIA-23
Shunsuke Mori, Keisuke Miyaji, Kazuhisa Kamgai, Tokyo University of Science

Prospects for CCS in the EU Energy Roadmap to 2050
Mikael Odenberg, Jan Kjärstad, Filip Johnsson, Chalmers University of Technology

Rethinking CCS – Developing Quantitative Tools for Designing Robust Policy in Face of Uncertainty
Jan Eide, Howard Herzog, Mort Webster, Massachusetts Institute of Technology

Actuarial Risk Assessment of Expected Fatalities Attributable to Carbon Capture and Storage in 2050
Min Ha-Duong, Rodica Loisel, CIRED, CNRS

Session 9D - Public Perception: Communication Activities and Experiences

Session Chairs: Peta Ashworth & Kenshi Itaoka

It's Not Only About Safety: Beliefs and Attitudes of 811 Local Residents Regarding a CCS project in Barendrecht
Bart Terwel, Emma ter Mors, Dancker Daamen, Leiden University

Lessons Learned from the Public Perception and Engagement Strategy - Experiences in CIUDEN's CCS Facilities in Spain
Monica Lupion, Andrea Pérez, Fernando Torrecilla, Fernando Torrecilla, CIUDEN

Application of Social Site Characterisation to Inform Public Engagement Efforts in Poland and the UK
Suzanne Brunsting, Mariëtte Pol, ECN; Marta Kaiser, Rene Zimmer, UfU; Simon Shackley, Leslie Mabon, The University of Edinburgh; Fiona Hepplewhite, Scottish Government; Marcin Mazurowski, Dorota Polak-Osiniak, PGNiG

The Evolution of Stakeholder Perceptions of Deploying CCS Technologies in China: Survey Results from Three Stakeholder Consultations in 2006, 2009 and 2012
Xi Liang, University of Edinburgh; David Rainer, University of Cambridge

Visual Message Mapping for CCS Outreach
Daniel Daly, EERC; Lydia Cumming, Pacific Northwest Laboratory; Gary Garrett, Southern States Energy Board; Marian Stone, Bevilacqua-Knight, Inc.; Mather Cather, New Mexico Tech; Lindsey Tollefson, Big Sky Carbon Sequestration Partnership; Sarah Wade, WADE, LLC

Session 9E - Oxy-Combustion: CO₂ Processing Unit

Session Chairs: Stanley Santos & Phil Sharman

Modelling the Fate of Sulphur During Pulverized Coal Combustion under Conventional and Oxyfuel Conditions
Michael Müller, Uwe Schnell, Günter Scheffknecht, University of Stuttgart

Optimized Multi-Pollutant Removal in Oxy-Fuel Power Plants with CO₂ Capture
Ahmed Shafeen, Kourosh Zanganeh, Ashkan Beigzadeh, Natural Resources Canada

Offgas Treatment After the Gas Processing Unit of a Coal-Fired Oxyfuel Power Plant with Polymeric Membranes and Pressure Swing Adsorption
Jens Dickmeis, Alfons Kather, Hamburg University of Technology

Optimization of Cryogenic CO₂ Purification for Oxy-Coal Combustion
Hailong Li, Mälardalens University; Yukun Hu, Royal Institute of Technology; Mario Ditaranto, SINTEF Energy; David Wilson, Stanbridge Capital; Jinyue Yan, Mälardalens University and Royal Institute of Technology

Simultaneous NO_x and SO_x Reduction from Oxyfuel Exhaust Gases using Acidic Solutions Containing Hydrogen Peroxide
Isabelle Liémans, Diane Thomas, Chemical Engineering Department, University of Mons

Session 9F - Trapping Mechanisms: Geochemical

Session Chairs: Toshiyuki Tosha & Don White

Thin Layer Detectability in a Growing CO₂ Plume; Testing the Limits of Time-Lapse Seismic Resolution
James White, Andy Chadwick, Gareth Williams, British Geological Survey

Tracing the Movement and the Fate of Injected CO₂ at the IEA Weyburn-Midale CO₂ Monitoring and Storage Project (Saskatchewan, Canada) using Isotopic Tracers
Bernhard Mayer, Michael Nightingale, Maurice Shevalier, Gareth Johnson, Ian Hutcheon, University of Calgary; Ernie Perkins, Alberta Innovates - Technology Futures

Introduction and Application of the Modified Patchy Saturation for Evaluating CO₂ Saturation by Seismic Velocity
Hiroyuki Azuma, OYO corporation; Chrisato Konishi, Stanford University; Zique Xue, RITE

Electrical Resistivity Tomography (ERT) for Monitoring CO₂ Migration - from Tool Development to Reservoir Surveillance at the Ketzin Pilot Site
Cornelia Schmidt-Hattenberger, Peter Bergmann, Tim Labitzke, Marcus Möller, Stephan Schröder, Florian Wagner, Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences; Harmut Schütt, Statoil ASA

Evaluating Wellbore Gravity for Time-Lapse CO₂ Plume Detection

Kevin Dodds, BP Alternative Energy; Richard Krahenbuhl, Yaoguo Li, Anya Reitz, Center for Gravity, Electrical & Magnetic Studies, Colorado School of Mines; Susan Hovorka, Gulf Coast Carbon Center, Bureau of Economic Geology

Session 9G - Transport and Infrastructure

Session Chair: Andrea Ramirez

Accurate Thermodynamic-Property Models for CO₂-Rich Mixtures

Roland Span, Johannes Gernert, Andreas Jäger, Ruhr-Universität Bochum

Combining Thermodynamic and Fluid Flow Modelling for CO₂ Flow Assurance

Svend Tol Munkejord, Mona Mølnevik, SINTEF Energy Research; Christian Bernstone, Vattenfall Research and Development AB; Sigmund Clausen, Gassco AS; Geleijn de Koeijer, Statoil R&D

Heat Transfer Characteristics of a Pipeline for CO₂ Transport with Various Surrounding Substances

Michael Drescher, Øivind Wilhelmsen, Peder Aursand, SINTEF Energy Research; Geleijn de Koeijer, Rudolf Held, Jan H. Borch, Statoil ASA

Corrosion in Dense Phase CO₂ – the Impact of Depressurisation and Accumulation of Impurities

Arne Dugstad, Bjørn Morland, Malgorzata Halseid, Anne Olaus Sivertsen, Institute for Energy Technology

Corrosion Mechanism and Impact Factor Analysis of Pipeline Steel in Supercritical CO₂ with Impurities

Yong Xiang, Zhe Wang, Zheng Li Weidou Ni, Tsinghua University

Technical Session 10

Session 10A - Risk Assessment and Management II

Session Chairs: Max Prins & Isabelle Czernichowski-Lauriol

Geomechanical Modeling of Fault Responses and the Potential for Notable Seismic Events During Underground CO₂ Injection

Jonny Rutqvist, Frederic Cappa, Alberto Mosaldi, Antonio Rinaldi, Lawrence Berkeley National Laboratory

Safety-Based Injection Strategy for Carbon Dioxide Geological Sequestration in a Deep Saline Aquifer with Complex Sandstone-Shale Sequences: A Case Study from Taiwan

Bieng-Zih Hsieh, Cheng-Yueh Wu, Zsay-Shing Lin, National Cheng Kung University; Ch-Chung Tseng, Ta-Lin Chen, CPC Corporation

Migration of CO₂ Through the Overburden and Potential Effects of Leakage on the Seafloor Environment: A Summary from QICS Work Package 1

Beil Burnside, Mark Naylor, University of Edinburgh; Karen Kirk, British Geological Survey; Simon Mathias, University of Durham; Fiona Whittaker, University of Bristol

The Bubble/Slug Flow Model for Methane Leakage from Natural Gas Wells as an Analogue for Shallow CO₂ Migration

Ian Duncan, BEG, University of Texas at Austin

Session 10B - Post-Combustion: Design

Session Chairs: John Topper & Mohammad Abu Zahra

Characterization of Novel Packings for Post Combustion Capture

Chao Wang, Micah Perry, Frank Seibert, Gary Rochelle, University of Texas at Austin

Numerical and Experimental Study on Liquid Film Flows on Packing Elements in Absorbers for Post-Combustion CO₂ Capture

Yoshiyuki Iso, Jian Huang, Mariko Kato, Shinsuke Matsuno, Kenji Takano, IHI Corporation

Novel Solvent-Gas Contactor for CO₂ Cost Reductions

Brandon Pavlish, Joel Downs, Nathan Fiala, EERC

Encapsulated Solvents for Carbon Dioxide Capture

Roger Aines, Christopher Spadaccini, Eric Duoss, Joshua Stolaroff, Lawrence Livermore National Laboratory; John Vericella, Jennifer Lewis, University of Illinois Urbana/Champaign; George Farthing, Babcock and Wilcox Company

Session 10C - Emerging Technologies

Session Chair: Steve Goldthorpe

Enhanced Oil Recovery Method using Carbonated Water Flooding

Lin Zuo, Sally Benson, Energy Resources Engineering, Stanford University; Changyon Zhang, Environmental Molecular Sciences Laboratory, Richland

Utilization of Carbon Dioxide as a Cushion Gas for Compressed Air Energy Storage

Curtis Oldenburg, Lehua Pan, Lawrence Berkeley National Laboratory

Identification of New Microbial Mediators for Electromethanogenic Reduction of Geologically-Stored Carbon Dioxide

Qian Fu, Hajime Kobayashi, Hideo Kawaguchi, Javier Vilcáez, Kozo Sato, The University of Tokyo

CO₂ Utilization from "Next Generation" CO₂ Enhanced Oil Recovery

Vello Kuuskraa, Tyler Van Leeuwen, Advanced Resources International, Inc.; Phil Dipietro, U.S. DOE/ National Energy Technology Laboratory

Session 10D - Public Perception: Social Science Research

Session Chairs: Peta Ashworth & David Reiner

Relating Individual Perceptions of Carbon Dioxide to Perceptions of CCS: An International Comparative Study

Kenji Itaoka, Aya Saito, Mizuho Information & Research Institute; Anne-Marie Dowd, Peta Ashworth, CSIRO; Marjolein de Best-Walderhoer, ECN

Exploring Media Representation of Carbon Capture and Storage: An Analysis of Japanese Newspaper Coverage in 1990-2010

Shinichiro Asayma, Atsushi Ishii, Tohoku University

CO₂CRC Otway Project Social Research: Assessing CCS Community Consultation

Tony Steeper, CO₂CRC

The Potential of Host Community Compensation in Facility Siting

Emma ter Mors, Bart W. Terwel, Dancker Daamen, Leiden University

Session 10E - Pre-Combustion: Technology

Session Chairs: Daan Jansen & John Davison

A Novel Adsorbent Material (MOF/MCM-41) for Pre-Combustion CO₂ Capture by Pressure Swing Adsorption

Nathalie Cass, Johanna Schell, Lisa Joss, Marco Mazzotti, Institute of Process Engineering, ETH Zurich; Richard Blom, SINTEF Materials and Chemistry

Advanced CO₂ Separation Technologies: Coal Gasification, Warm-Gas Cleanup, and Hydrogen Separation Membranes

Joshua Stanislaw, Scott Tolbert, Tyler Curran, EERC

High Performance CO₂ Capture by Autothermal AGR System

Yasushi Mori, Mitsubishi Heavy Industries Compressor Corporation; Jonathan Forsyth, BP Alternative Energy International Ltd

Coal-CO₂-Slurry Feed for Pressurised Gasifiers: Slurry Preparation System Characterisation and Economics

Cristina Botero, Howard Herzog, Ahmed Ghoniem, Massachusetts Institute of Technology

Session 10F - Trapping Mechanisms: Capillarity and Heterogeneity

Session Chairs: James Sorensen & Sam Holloway

Clay Hydration/Dehydration in Dry to Water-Saturated Supercritical CO₂: Implications for Caprock Integrity

John Loring, Todd Schaef, Chris Thompson, Quinn Miller, Jianzhi Hu, David Hoyt, Paul Martin, Eugene Ilton, Andrew Felmy, Kevin Rosso, Pacific Northwest National Laboratory

Capillary Heterogeneity in Sandstones Rocks During CO₂/Water Core-Flooding Experiments

Ronny Pini, Mike Krause, Sally Benson, Stanford University; Sam Krevor, Imperial College London

Seal Integrity of the Rousse Depleted Gas Field Impacted by CO₂ Injection (Lacq Industrial CCS Reference Project - France)

Dominique Pourtoy, Marc Lescanne, Sylvian Thibeau, Atef Onaisi, Calire Viaud, TOTAL E&P

Estimation of Local Capillary Trapping Capacity from Geologic Models

Eshan Saadatpoor, Steven Bryant, Kamy Sepehrnoori, The University of Texas at Austin

Session 10G - Other Underground Storage Options

Session Chairs: Malcolm Wilson & Alain Bonneville

Geochemical Aspects of In-Situ Mineralization of CO₂ in Seafloor Basalts in the Presence of Seawater

Dominic Wolff-Boenisch, Iwona Galeczka, Sigurdur Gislason, University of Iceland, Eric Oelkers, Université de Toulouse

Mineralization of Basalts in the CO₂-H₂O-H₂S System

H.T. Schaefer, B.P. McGrail, A.T. Owen, Pacific Northwest National Laboratory

CO₂ Injectivity in a Multi-Lateral Horizontal Well in a Low Permeability Coal Seam: Results from a Field Trial

Zhejun Pan, Luke Connel, Michael Camilleri, Dave Down, John Carras, Meng Lu, CSIRO; Shangzhi Meng, Xiaokang Fu, Wenzhong Zhang, Benguang Guo, CUCBM

Feasibility Study on CO₂ Micro Bubble Storage (CMS)

Kenichirou Suzuki, Takashi Hitomi, Masato Shimoyama, Obayashi Corporation; Hideaki Miida, Hiroshi Wada, ENAA, Shigeo Horikawa, Suncoch Consultants Co. Ltd.; Takeyuki Ebi, Kajima Corporation, Kaoru Inaba, Takenaka Corporation

Technical Session 11

Session 11A - Modeling: Reservoir-Scale Flow and Transport

Session Chairs: Philip Ringrose & Jonathan Ennis King

Geochemical Reservoir Simulation of the Weyburn CO₂-EOR Field

Stephen Talman, Ernie Perkins, Alireza Jafari, Alberta Innovates - Technology Futures; Maurice Shevalier, University of Calgary

The Effect of Geological Structure and Heterogeneity on CO₂ Storage in Simple 4-way Dip Structures; a Modelling Study from the UK Southern North Sea

John Williams, Michelle Bentham, British Geological Survey; Min Jin, Gillian Pickup, Eric Mackay, Heriot-Watt University; Dennis Gammer, Andrew Green, Energy Technologies Institute

Sensitivity of Long-Term CO₂ Sequestration Simulation Result to the Treatment of Capillary Entry Pressure

Baxiao Li, Hamdi Tchelepi, Sally Benson, Stanford University

Potential Subsurface Impacts of CO₂ Stream Impurities on Geologic Carbon Storage

Jean-Philippe Nicot, Katherine Romanak, Patrick Mickler, Silvia Solano, Changbing Yang, Jiemen Lu, Tongwei Zhang, Bureau of Economic Geology, The University of Texas at Austin

Session 11B - Post-Combustion: Solvent Fundamentals

Session Chairs: Takayuki Higashii & Prachi Singh

Corrosion Investigations in MEA Based Post-Combustion CO₂ Capture Pilot Plants

Séverine De Vroey, Pascale Absil, Marie-Laure Thielens, Laborelec

Corrosivity of Single and Blended Amines in CO₂ Capture Process

Prakashpathi Gunasekaran, Amornvadee (Amy) Veawab, Adisorn Aroonwilas, University of Regina

Prediction of N₂O Solubilities in Alkanolamine Solutions from the Excess Volume Property

Ardi Hartono, Emmanuel Mba, Hallvard Svendsen, NTNU

Solids Modelling and Capture Simulation of Piperazine in Potassium Solvents

Philip Loldrup Fosbøl, Bjørn Maribo-Mogensen, Kaj Thomsen, The Technical University of Denmark

Session 11C - CCS and Geothermal

Session Chairs: Gunter Sidiqi & Samantha Neades

Integrated Geothermal-CO₂ Reservoir Systems: Reducing Carbon Intensity Through Sustainable Energy Production and Secure CO₂ Storage

Thomas A. Buscheck, Mingjie Chen, Yunwei Sun, Yue Hao, Chuanhe Lu, Thomas J. Wolery, Roger D. Aines, Lawrence Livermore National Laboratory; Michael A. Celia, Princeton University

Geothermal Energy Production Coupled With CCS: Field Demonstration at the SECARB Cranfield Site, Cranfield, Mississippi, USA

Barry Friefeld, Christine Doughty, Lawrence Berkeley National Laboratory; Bruce Cutright, University of Texas; Steve Zakim, Ming Sheu, Timothy Held, Echogen Power Systems, LLC

From Competition to Synergy - Support Geothermal Exploitation by Geological CO₂ Storage

Elena Tillner, Thomas Kempka, Egbert Jolie, Michael Kühn, GFZ German Research Centre for Geosciences

Synergy Benefits in Combining CCS and Geothermal Energy Production

Carsten M. Nielson, Peter Frykman, Geological Survey of Denmark and Greenland; Finn Dalhoff, Vattenfall Research & Development AB

Session 11D - Risk Management: Contingency Planning and Remediation

Session Chairs: Bill Senior & Rajesh Pawar

CO₂ Storage Contingencies Initiative: Detection, Intervention and Remediation of Unexpected CO₂ Migration

Scott Imbus, Chevron Energy Technology Co.; Kevin Dodds, BP Alternative Energy; Robert Trautz, Electric Power Research Institute; Claus Otto, Shell Global Solutions International; Charles Christopher, CO2Store; Sally Benson, Stanford University

How to Establish CO₂ Flow/Concentration Warning Levels Based on the Geochemical Monitoring Baseline: Specific Case of CO₂ Storage at Claye-Souilly (Paris Basin)

Natalia Quisel, Stéphane Thomas, VEOLIA Environnement Recherche & Innovation; Jacques Pironon, Philippe de Donato, Judith Saussea, Odile Barres, MAGES group, Université de Lorraine-CNRS; Zbigniew Pokryszka, INERIS, Parc Technologique Alata

Natural Mitigation of CO₂ Leakage Accumulations:

Jean-Charles Manceau, Jérémy Rohmer, Arnaud Réveillère, BRGM

Estimating CO₂ Leakage Rate Along a Fault: Model and Field Application

Qing Tao, Steven Bryant, The University of Texas at Austin; David Alexander, The University of Trinidad and Tobago

Session 11E - System Integration III: Other

Session Chairs: Shunsuke Mori & Andrea Ramirez

Evaluation of CO₂ Post Combustion Capture Integration with Natural Gas Power Plant and Desalination Co-Generation Plant

Stephen Fadeyi, Hassan Fath, Mohammad Abu-Zahra, Masdar Institute of Science and Technology

Investigating Flexible Carbon Capture Opportunities in the Australian Electricity Market

Yuanfei Zhang, Monh Ho, Dianne Wiley, The University of New South Wales and CO2CRC

Climate Mitigation's Impact on Global and Regional Electric Power Sector Water Use in the 21st Century

Evan Davies, University of Alberta; Page Kyle, James Dooley, Pacific Northwest National Laboratory

CCS Feasibility Improvement in Industrial and Municipal Applications by Heat Utilisation

Janne Kärki, Eemeli Tsupari, Antti Arasto, VTT Technical research centre of Finland

Session 11F - Ex Situ Mineralisation of CO₂

Session Chair: Millie Basava-Reddi

Integrated Mineral Carbonation Reactor Technology for Sustainable Carbon Dioxide Sequestration: 'CO₂ Energy Reactor'

Rafael Santos, Wouter Verbeek, Jens van Bouwel, Tom Van Gerven, Yiannis Pontikes, KU Leuven; Pol Knops, Keesjan Rijnsburger, Innovation Concepts B.V.

Carbon Storage by Mineralisation (CSM): Serpentine Rock Carbonation Via Mg(OH)₂ Reaction Intermediate Without CO₂ Pre-Separation

Ron Zevenhoven, Johan Fagerlund, Experience Nduagu, Inês Romão, Åbo Akademi University; Jie Bu, James Highfield, ICES - A*STAR

Assessment of the Energy Requirements for CO₂ Storage by Carbonation of Industrial Residues

Renato Baciocchi, Giulia Costa, Daniela Zingaretti, University of Rome Tor Vergata

Carbonation of Activated Serpentine for Direct Flue Gas Mineralization

Mischa Werner, Subrahmaniam Hariharan, Marco Mazzotti, ETH Zurich; Renato Baciocchi, Daniela Zingaretti, University of Rome Tor Vergata

Session 11G - Oxy-Combustion: Large Scale Implementation

Session Chair: Olav Bolland

Initial Operation Results of Oxyfuel Power Plant in Callide Oxyfuel Project

Takahiro Gotou, Terutoshi Uchida Toshihiki Yamada, Tetsuya Hori, IHI Corporation; Chris Spero, CS Energy Ltd.

Young Dong Unit 1 Oxyfuel Feasibility Study and FEED

Michael Maloney, Konrad Kuczynski, Makesh Kaliyaperumal, Doosan Power Systems; H.P. Kim, Doosan Heavy Industries & Construction

The Air Products-Vattenfall Oxyfuel CO₂ Compression and Purification Pilot Plant at Schwarze Pumpe

Vince White, Andrew Wright, Air Products PLC, Stephanie Tappe, Vattenfall Europe Generation AG; Jinying Yan, Vattenfall Research & Development AB

Oxycombustion for Carbon Capture on Coal Power Plants: Advantages, Technical Challenges and Innovative Mitigation Solutions

Nicolas Perrin, Richard Dubettier, Jean-Pierre Tranier, Air Liquide

40

Posters shown here in **Blue** will be presented in Poster Session A on Tuesday the 20th of November, between 13.40 - 15.40.

Posters shown here in **Black**, will be presented in Poster Session B on Wednesday the 21st of November, between 13.40 - 15.40.

Entrance

Poster Desk

618	617	616	615	614	613	612	611	610	609	608	607	606
593	594	595	596	597	598	599	600	601	602	603	604	605
568	567	566	565	564	563	562	561	560	559	558	557	556
543	544	545	546	547	548	549	550	551	552	553	554	555
518	517	516	515	514	513	512	511	510	509	508	507	506
493	494	495	496	497	498	499	500	501	502	503	504	505
468	467	466	465	464	463	462	461	460	459	458	457	456
443	444	445	446	447	448	449	450	451	452	453	454	455
418	417	416	415	414	413	412	411	410	409	408	407	406
395	396	397	398	399	400	401	402	403	404	405		
370	369	368	367	366	365	364	363	362	361	360		
350	351	352	353	354	355	356	357	358	359			
325	324	323	322	321	320	319	318	317	316			
306	307	308	309	310	311	312	313	314	315			
281	280	279	278	277	276	275	274	273	272			
259	260	261	262	263	264	265	266	267	268	269	270	271
234	233	232	231	230	229	228	227	226	225	224	223	222
209	210	211	212	213	214	215	216	217	218	219	220	221
184	183	182	181	180	179	178	177	176	175	174	173	172
159	160	161	162	163	164	165	166	167	168	169	170	171
134	133	132	131	130	129	128	127	126	125	124	123	122
109	110	111	112	113	114	115	116	117	118	119	120	121
84	83	82	81	80	79	78	77	76	75	74	73	72
59	60	61	62	63	64	65	66	67	68	69	70	71
34	33	32	31	30	29	28	27	26	25	24	23	22
9	10	11	12	13	14	15	16	17	18	19	20	21

Poster Session Details

On the following pages you will find the details of all posters on display at GHGT-11.

Posters listed in **Blue** will be presented in Poster Session A, while those listed in **Black**, will be presented in Poster Session B.

Session A: Tuesday 20th November: 13.40 - 15.40

Session B: Wednesday 21st November: 13.40 - 15.40

Advances in CO₂ Capture Technology Development Adsorption

1. **Studies of Ca-Based High Temperature Sorbents for CO₂ Capture**
Bjørnar Arstad, Richard Blom, Joanna Prostek, SINTEF
2. **Carbon Dioxide Capture from Flue Gases by Solid Sorbents**
Mustafa Abunowara, Libyan Petroleum Institute; Mohammed Elgarni, HTe Purenergy Inc.
3. **Optimizing Solid Sorbents for CCS**
Adam Berger, Abhoyjit Bhowan, SINTEF
4. **On the Development of Vacuum Swing Adsorption (VSA) Technology for Post-Combustion CO₂ Capture**
Anne Anderson, Jasmina Hafizovic Cavka, Aud Spjelkavik, Richard Blom, SINTEF Materials & Chemistry; Amar N. Goswami, Anshu Nanoti; Indian Institute of Petroleum
5. **Efficient and Rapid Screening of Novel Adsorbents for Carbon Capture in the UK IGSCC Project**
Stefano Brandani, Enzo Mangano, Maria-Chiara Ferarri, The University of Edinburgh; Magdalena Malgorzata Lozinka, Paul Anthony Wright, Juergen Kahr, Russell Morris, University of St. Andrews; Matthew Craod, Neil McKeown, Cardiff University; Peter Budd, The University of Manchester
6. **Characterisation of an Automated Dual Piston Pressure Swing Adsorption (DP-PSA) System**
Daniel Friedrich, Wenli Dang, Stefano Brandani, Institute for Materials and Processes, University of Edinburgh
7. **Post-Combustion CO₂ Capture using Solid Sorbents: 1 MW Pilot Scale Evaluation**
Holly Krutka, Sharon Sjostrom, Travis Starns, Cody Wilson, ADA Environmental Solutions
8. **Development of in-Situ CO₂ Capture Coal Utilization Technologies**
Shiying Lin, Hironobu Oshima, Japan Coal Energy Center
9. **Performance Evaluation of Aqueous Carbonation for Steelmaking Slag: Process Chemistry**
Shu-Yuan Pan, Pen-Chi Chiang, National Taiwan University, Yi-Hung Chen, National Taipei University of Technology; E-E Chang, Taipei Medical University
10. **The Status of the Development Project for the 10 MWe-Scale Dry-Sorbent Carbon Dioxide Capture System to the Real Coal-Fired Power Plant in Korea**
Young Cheol Park, Sung-Ho Jo, Dong-Ho Lee, Chang-Keun Yi, Korea Institute of Energy Research; Chong Kul Ryu, Korea Electric Power Research Institute; Ki-Seok Kim, KEPCO Engineering & Construction Company, INC.; Chan Hyo You, Korea Southern Power Co., Ltd.; Ki Suh Park, KC Cottrell Co., Ltd.
11. **Dynamic Cyclic Performance of Phenol-Formaldehyde Resin-Derived Carbons for Pre-Combustion CO₂ Capture: An Experimental Study**
Susana Garcia, Claudia F. Martín, Jose J. Pis, Fernando Rubiera, Cova Pevida, INCAR-CSIC
12. **Postcombustion CO₂ Capture Adsorbents from Spent Coffee Grounds**
Ana Silvia González, Marta G. Plaza, Jose, J. Pis, Fernando Rubiera, Cova Pevida, INCAR-CSIC
13. **Process Simulation of Ca-Looping Processes: Review and Guidelines**
Matteo Carmelo Romano, Politecnico di Milano; Isabel Martínez, Ramón Murillo, Instituto de Carboquímica (ICB-CSIC); Dursun Can Ozcan, Hyungwoong Ahn, IMP-SEE, The University of Edinburgh, Richard Blom, SINTEF Material and Chemistry
14. **Alkylamine-Based Adsorbents Synthesized using High Internal Phase Emulsion Technique for Carbon Dioxide Adsorption**
Chintana Saiwan, Pailin Muchan, Petroleum and Petrochemical College, Chulalongkorn University; David deMontigny, Petroleum and Petrochemical College, Chulalongkorn University

15. **Study of Carbon Dioxide (CO₂) Adsorption for Fossil Fuel Based Power Plant Flue Gas Application using Quaternized Biopolymer**
Chintana Saiwan, Nattida Sotthinirandorn, Petroleum and Petrochemical College, Chulalongkorn University; Raphael Idem, Paitoon Tontiwachwuthikul, Teeradet Supap, International Test Centre for CO₂ Capture, University of Regina; Panya Wongpanit, Faculty of Agricultural Product Innovation and Technology, Srinakharinwirot University
16. **Effect of Polyethyleneimine Loading into High Internal Phase Emulsion Polymer for Carbon Dioxide Adsorption**
Chintana Saiwan, Pacharakhorn Dejburum, Petroleum and Petrochemical College, Chulalongkorn University; Petroleum and Petrochemical College, Chulalongkorn University
17. **Comparison of Commercial and New Adsorbent Materials for Pre-Combustion CO₂ Capture by Pressure Swing Adsorption**
Joanna, Schell, Nathalie Casas, Dorian Marx, Marco Mazzotti, Institute of Process Engineering ETH Zürich, Zürich, Switzerland; Richard Blom, SINTEF materials and chemistry, Oslo, Norway
18. **Nanoparticle-Supported Amine for High Capacity CO₂ Adsorbents**
Fritz Simeon, T. Alan Hatton, Massachusetts Institute of Technology
19. **CO₂ Capture by Mesoporous SBA-15 Grafted with 3-Aminopropyl Triethoxysilane in Supercritical Propane**
Chung-Sung Tan, Worasaung Klinthong, Chih-Hung Huang, Department of Chemical Engineering, National Tsing Hua University
20. **Qualification of the ALKASORB Sorbent for the Sorption-Enhanced Water-Gas Shift Process**
Edward Van Selow, Paul Cobden, Eric Van Dijk, Paul Verbraeken, Daniel Jansen, Energy Research Centre of the Netherlands
21. **Calcium Looping Process: Oxyfuel Sorbent Regeneration Experimental Validation of a Carbonator Model & Investigation of Sorbent Performance Regenerated under High CO₂ Partial Pressure**
Glykeria Varela, Ajay Ramesh Bidwe, Craig Hawthorn, Lucia Bernard, Mariusz Zeiba, Günter Scheffknecht, Uni. Stuttgart/ IFK
22. **Development of Amine-Modified Solid Sorbents for Post Combustion CO₂ Capture**
Katsunori Yogo, Shingo Kazama, Research Institute of Innovative Technology for the Earth (RITE), Chemical Research and Nara Institute of Science and Technology (NAIST); Tsuyoshi Watabe, Research Institute of Innovative Technology for the Earth (RITE), Chemical Research; Yosuke Nishizaka, Nara Institute of Science and Technology (NAIST)
23. **Enhancing Sorption Performance of Solid Amine Sorbents for CO₂ Capture by Additives**
Zhonghua Zhang, National Institute of Clean-and-Low-Carbon Energy, and China University of Mining and Technology; Boadong Wang, Qi Sun, National Institute of Clean-and-Low-Carbon Energy; Xiaoliang Ma, Kuwait Institute for Scientific Research and EMS Energy Institute; Yonggang Wang, China University of Mining and Technology

Advanced Solvents

24. **Evaluation of Amine-Blend Solvent Systems for Post-Combustion Capture Applications**
Adewale Adeson, Mohammad Abu Zahra, Masdar Institute of Science and Technology
25. **Developments in the CO₂CRC UNO Mk 3 Process - a Multi-Component Solvent Process for Large Scale CO₂ Capture**
Calre Anderson, Trent Harkin, Abdul Qader, Narry Hooper, CO₂CRC; Mihn Ho, The University of NSW
26. **Understanding Precipitation in Amino Acid Salts at Process Conditions**
Ugochukwu E. Aronu, Innas Kim, SINTEF Materials and Chemistry; Adri Hartono, Department of Chemical Engineering, Norwegian University of Science and Technology
27. **Strategic Vapor Suppressing Additives for Ammonia Based CO₂ Capture Solvent**
Moetaz Attalla, Stefan Salentinig, Phil Jackson, CSIRO; Ben Ballinger, University of Queensland
28. **Detailed Studies on the Absorption Kinetics of CO₂ in Aqueous Solutions for Small Superficial Liquid Loadings**
Peter Behr, Alexander Tunnat, Andre Maun, Klaus Görner, University Duisburg-Essen

29. **Solvent Selection for Post-Combustion CO₂ Capture**
Juan Salizer, Urmila, Diwekar, Vishwamitra Research Institute; Kevin Joback, Molecular Knowledge Systems; Adam Beger, Abhoyjit Bhowan, Electric Power Research Institute
30. **Synthesis and Characterization of New Absorbents for CO₂ Capture**
Firoz Alam Chowdhury, Hidetaka Yamada, Takayuki Higashio, Shingo Kazama, Research Institute of Innovative Technology for the Earth (RITE); Yoichi Matsuzaki, Nippon Steel Corporation
31. **CO₂-Binding Organic Liquids Gas Capture with Polarity-Swing-Assisted Regeneration**
David Heldebrand, Charles Freeman, Feng Zheng, Phillip Keoch, Mark Bearden, Michael Elliot, Pacific Northwest National Laboratory
32. **Screening and Characterization of Advanced Amine Based Solvent Systems for CO₂ Post-Combustion Capture**
Ali Imran, Adewalw Adeosun, Mohammad Abu Zahra, Masdar Institute of Science and Technology
33. **Oxidative Degradation of AMP/MEA Aqueous Blends**
Klaus-J Jens, Telemark University College; Teilin Wang, Telemark Technological R & D Institute and Telemark University College
34. **Evaluation of Carbon Dioxide Absorption by Amine Based Absorbent**
Yasuhiro Kato, Shinji Murai, Daigo Miraoka, Takehiko Muramatsu, Satoshi Saito, Toshiba Corporation
35. **Real Time Mechanistic Insights for CO₂ Capture with Liquid Amine Absorbents**
Pavel Kortunov, Lisa Baugh, David Calabro, Micahel Siskin, Jand Thomann, ExxonMobil Research and Engineering
36. **Absorption Rates and CO₂ Solubility in New Piperazine Blends**
Le Li, Yang Du, Omkar Namjoshi, Gary Rochelle, Department of Chemical Engineering, University of Texas at Austin; Han Li, State Key Laboratory of Chemical Engineering, Tsinghua University
37. **Modeling Pilot Plant Results for CO₂ Stripping using Piperazine in a Two Stage Flash**
Tarun Madan, David Van Wagener, Eric Chen, Gary Rochelle, University of Texas at Austin
38. **Ab Initio Study of CO₂ Capture Mechanisms in Monoethanolamine Aqueous Solution: Reaction Pathways from Carbamate to Bicarbonate**
Yoichi Matsuzaki, Masami Onoda, Nippon Steel Corporation; Firoz Alam Chowdhury, Takayuki Higashii, Shingo Kazama, Research Institute of Innovative Technology for the Earth (RITE)
39. **Location-Specific Technoeconomic Evaluation of a Novel Amine Technology**
Dale Jones, Thomas McVey, Julio Friedmann, Lawrence Livermore National Laboratory
40. **Development of Hindered New Amine Absorbents for CO₂ Capture**
Shinji Murai, Yasuhiro Kato, Yukishige Maezawa, Takehiko Muramatsu, Satoshi Sato, TOSHIBA
41. **Promoting CO₂ Absorption in Aqueous Amines with Benzylamine**
Gilles Richner, CSIRO
42. **Lab-Scale Characterization of CO₂ Absorbents Containing Various Amine Species**
Hiroshi Sato, Kumiko Yoshihisa, Nobuhiko Kubota, Research Laboratory, IHI Corporation; Katsumi Takahashi, IHI Technology Solutions Inc.; Ario Matsumoto, Yasuro Yamanaka, Power Plant Division, IHI Corporation; Yukio Furukawa, Department of Chemistry and Biochemistry, Graduate School of Advanced Science and Engineering, Waseda University
43. **Aqueous 2-Methylpiperazine/Piperazine for Carbon Capture**
Brent Sherman, Xi Chen, Thu Nguyen, Stephanie Freeman, Gary Rochelle, University of Texas at Austin
44. **Mixed Alkanolamines with Low Regeneration Energy for CO₂ Capture in a Rotating Packed Bed**
Cheng-Hsiu Yu, Chung-Sung Tan, Department of Chemical Engineering, National Tsing Hua University
45. **Demonstration Test Result of High Pressure Acid-Gas Capture Technology (HiPACT)**
Koji Tanaka, Yasushi Fujimura, JGC Corporation; Takehiro Komi, INPEX CORPORATION; Torsten Katz, Oliver Spuhl, BASF SE; Erick Contreras, BASF East Asia Headquarters Ltd.
46. **Study on Potential Biphasic Solvents: Absorption Capacity, CO₂ Loading, and Reaction Rate**
Zhicheng Xu, Shujuan Wang, Changhe Chen, Tsinghua University

47. **Effect of Alcohol Chain Length on Carbon Dioxide Absorption into Aqueous Solutions of Alkanolamines**

Hidetaka Yamada, Firoz Chowdhury, Kazuya Goto, Takayuki Higashii, Shingo Kazama, Research Institute of Innovative Technology for the Earth; Yoichi Matsuzaki, Nippon Steel Corporation

48. **Development of Chemical CO₂ Solvent for High-Pressure CO₂ Capture**

Shin Yamamoto, Takayuki Higashii, Shingo Kazama, Chemical Research Group, Research Institute of Innovative Technology for the Earth; Hiroshi Machida, Department of Chemical Engineering, Graduate School of Engineering, Nagoya University; Yuicho Fujioka, Department of Environmental Sciences, International College of Arts and Sciences, Fukuoka Women's University

Capture from Power Plants, Gas Fields, Industrial Plants and Transportation Fuels and Technologies.

49. **United State National Carbon Capture Center Status**

Frank Morton, Roxann Laird, John Northington, Southern Company

Chemical Looping

50. **ZrO₂-Supported CuO Oxygen Carriers for Chemical-Looping with Oxygen Uncoupling (CLOU)**

Mehdi Arjmand, Henrik Leion, Chalmers University of Technology, Division of Environmental Inorganic Chemistry; Tobias Mattisson, Anders Lyngfelt, Chalmers University of Technology, Division of Energy Technology

51. **Characterization of Spray-Dried NO Oxygen Carrier Supported on Alpha Alumina**

Jeom-In Baek, Joong Beom Lee, Tae-Hyoung Eom, Kyeong-Sook Kim, Seug-Ran Yang, Chong Kul Ryu, KEPCO Research Institute

52. **Reactor Choices for Chemical Looping Combustion (CLC) – Dependencies on Materials Characteristics**

Erin Kimball, W.A.P. van den Bos, W.A.P. van den Bos, TNO; Arnold Lambert, Elodie Comte, IFPEN; Richard Blom, Anita Fossdal, Yngve Larring SINTEF

53. **3D Hydrodynamic Simulation of a Chemical Looping Combustion with Two Interconnected Fluidized Beds**

Jian Chang, Kai Zhang, Honggang Chen, Yongpin Yang, North China Electric Power University; Yanjun Guan, China University of Petroleum

54. **Operation and scale-Up of Fixed Bed Chemical Looping Combustion**

Erin Kimbal, Patricia van der Bos, Arthur Bezuijen, Judith Jahn, Aral Gootheer, Peter van den Broeke, TNO

55. **Evaluation of a Highly Reactive and Sulfur Resistant Synthetic Fe-Based Oxygen Carrier for CLC using Gaseous Fuels**

Pilar Gayan, Arturo Cabello, Francisco García-Labiano, Alberto Abad, Luis de Diego, Juan Adanez, Miguel Angel Pans, Cristina Dueso, Instituto de Carboquímica- CSIC

56. **Coal Chemical-Looping Combustion for Electricity Generation: Investigation for a 250 MWe Power Plant**

Yann Le Moullec, Olivier Authier, EDF R&D

57. **Chemical-Looping Combustion of Solid Fuels in a 10 kW Reactor System using Natural Minerals as Oxygen Carrier**

Carl Linderholm, Anders Lyngfelt, Chalmers tekniska högskola; Cristina Dueso, Instituto de Carboquímica (ICB-CSIC)

58. **Chemical Looping for Pre-Combustion CO₂ Capture – Performance and Cost Analysis**

Hari Mantripragada, Edward Rubin, Carnegie Mellon University

59. **Process Design of a Hydrogen Production Process for Power Generation Based on a Cu-Ca Chemical Loop**

Isabel Martinez, Ramon Murillo, Gemma Grasa, Instituto de Carboquímica (Consejo Superior de Investigaciones Científicas); Jose Ramon Fernandez, Juan Carlos Adanades, Instituto Nacional del Carbón

60. **Innovative Oxygen Carrier Materials for Chemical Looping Combustion**

Tobias Mattisson, Magnus Ryden, Peter Hallberg, Anders Lyngfelt, Dazheng Jing, Ali Hedayati, Chalmers University of Technology; Jasper Van Noyen, Frans Snijkers, VITO-Flemish Institute for Technological Research

61. **Chemical-Looping Combustion with Liquid Fuels**
Tobias Mattisson, Patrick Moldenhauer, Magnus Ryden, Anders Lyngfelt, Dazheng Jing, Ali Hedayati, Chalmers University of Technology; Bandat Fadhel, Jean-Pierre Ballaguet, Saudi Aramco

Costs (capture related)

62. **Cost Analysis for CO₂ Capture Process using Aqueous Ammonia at RIST**
Je Young Kim, Kunwo Han, Chi Kyu Ahn, Man Su Lee, Chang Houn Rhee, Hee Dong Chun, RIST

Environmental Impacts of CO₂ Capture

63. **Preliminary Studies into the Environmental Fate of Nitrosamine and Nitramine Compounds in Aquatic Systems**
Andy Booth, Eirik Falck da Silva, Odd Gunnar Brakstad, Kolbjørn Zahlén, SINTEF Materials and Chemistry
64. **The Use of Amine Reclaimer Wastes as a NO_x Reduction Agent**
Deshai Botheju, Lars-Andre Tokheim, Telemark University College, Norway; Peter Glarborg, Technical University of Denmark, Denmark
65. **Nitrosamine Degradation by UV Light Radiation in Post-Combustion CO₂ Capture: Demonstration**
Ferran de Miguel, Henk Trap, Earl Goetheer, TNO; Alexander Voice, University of Texas at Austin
66. **A New Test Rig for Studies of Degradation of CO₂ Absorption Solvents at Process Conditions; Comparison of Test Rig Results and Pilot Plant Data for Degradation of MEA (Mono-Ethanolamine)**
Aslak Einbu, Eirik Falck da Silva, Geir Haugen, Andreas Grimsstvedt, Kristin Lauritsen, Terje Vassbotn, SINTEF Materials and Chemistry
67. **Evaluation of Amine Emissions from the Post-Combustion CO₂ Capture Pilot Plant**
Koshito Fujita, Daigo Muraoka, Takashi Ogawa, Hideo Kitamura, Kensuke Suzuki, Satoshi Saito, Toshiba Corporation
68. **Potential Toxicological Effects of Amines Used for Carbon Capture and Storage and their Degradation Products**
Annette Rohr, Stephanie Shaw, Aladio Knipping, Electric Power Research Institute; Jacob McDonald, Melanie Doyle-Eisele, Dean Kracko, Lovelace Respiratory Research Institute
69. **Evaluation of Monoethanolamine-Based CO₂ Capture Processes By-Product Handling Approaches Considering Regulation in UAE**
Laila Nurrokhmah, Toufic Mezher, Mohammad Abu Zahra, Masdar Institute of Science and Technology

70. **EPRI Community Efforts on Health and Environment Impacts of Amines for Post-Combustion Carbon Capture**
Stephanie Shaw, Annette Rohr, Eladio Knipping, EPRI Environment Division; Moetaz Attalla, CSIRO Energy Technology; Karl Anders Hoff, SINTEF Materials and Chemistry
71. **Emissions from CO₂ Capture Plants; An Overview**
Eirik Falck da Silva, Karl Anders Hof, Andy Booth, SINTEF Materials and Chemistry
72. **Environmental Impacts of CO₂ Leakage: Recent Results from the ASGAR Facility, UK**
Karon Smith, Michael Steven, University of Nottingham; David Jones, Julia West, Neil Breward, Kay Green, Tom Barlow, British Geological Survey; Simone Gwosdz, Martin Kruger, Bundesanstalt für Geowissenschaften und Rohstoffe; Stan Beaubien, Università di Roma "La Sapienza"
73. **Potential Impact of CO₂ on Subsurface Microbial Ecosystems and Implications for the Performance of Storage Reservoirs**
Joanna Wragg, Julia West, Keith Bateman, Heather Harrison, Kay Green, Antonni Milodows, Jeremy Rushton, Gren Turner, Doris Wagner, David Jones, British Geological Survey

Experiences and Case Studies

74. **Effect of CO₂ Purity on Energy Requirement of CO₂ Capture Processes**
Kazuya Goto, Shingo Kazama, RITE; Atsuyoshi Furukawa, Masahiro Serizawa, Satoshi Aramaki, Kazuo Shoji, Japan CCS Ltd
75. **Result of the 60 tpd CO₂ Capture Pilot Plant in European Coal Power Plant with KS-1 Solvent**
Osamu Miyamoto, Takashi Kamijo, Yoshiki Sorimachi, Daisuke Shimada, Hiromitsu Nagayasu, Hiroshi Tanaka, Mitsubishi Heavy Industries, Ltd.; Angela Mangiaracina, ENEL Ingegneria e Innovazione, SpA
76. **Advanced Amine Process Technology Pilot Plant at Le Havre: First Operations and Results**
Tina Edvardsson, Barath Baburao, Larry Czarnecki, Alstom Power; Craig Shubert, The Dow Chemical Company; Olivier Déruelle, Islem Haji, Fabrice Chopin, Yann Le Moullec, Électricité de France
77. **Do We Underestimate the Impact of Particles in Coal-Derived Flue Gases in Amine Based CO₂ Capture Processes?**
Bern Schallert, Siegfries Neuhaus, Chris Satterley, E.ON New Build & Technology GmbH; Satish Reddy, Fluor Enterprises, Inc.

Fundamentals of Scrubbing

78. **Measurement of Heat of CO₂ Absorption into 2-Amino-2-Methyl-1-Propanol (AMP)/ Piperazine Blends using Differential Reaction Calorimeter**
Qian Xie, Adisorn (Andy) Aroonwilas, Amornvadee Veawab, Energy Technology Laboratory, University Of Regina
79. **Experimentally Based Evaluation of Accuracy of Absorption Equilibrium Measurements**
Dag Eimer, Tel-Tek and Telemark University College; Anita B. Elverhøy, Chameera K. Jayarathna, Tel-Tek
80. **¹³C-NMR Spectroscopic Study on Chemical Species in Piperadine-Amine-CO₂-H₂O System Before and After Heating**
Miho Nitta, Masaki Hirose, Toru Abe, Yokio Furukawa, Waseda University; Hiroshi Sato, Yasuro Yamanaka, IHI Corporation
81. **Mass Transfer of CO₂ Absorption into Hybrid MEA-Methanol Solvents in Packed Column**
Paitoon Tontiwachwuthikul, Zhiwu Liang, Raphael Idem, University of Regina and Hunan University; Teerawat Sema, Abdulaziz Naami, University of Regina
82. **Low Toxic Organic Corrosion Inhibitors for Amine-Based CO₂ Capture Process**
Sureshkumar Srinivasan, Amy Veawab, Adisorn Aroonwilas, University of Regina
83. **Corrosion Prediction of Carbon Steel in MEA-based CO₂ Capture Process**
Ameerudeen Najumudeen, Amy Veawab, Adisorn Aroonwilas, University of Regina
84. **SO₂ Effect on Degradation of MEA and Some Other Amines**
Shan Zhou, Shujuan Wang, Chenchen Sun, Shanghe Chen, Key Laboratory for Thermal Science and Power Engineering of Minister of Education

Membranes

85. **Natural Gas Upgrading Through Hydrogen Selective Membranes: Application in Carbon Free Combined Cycles**
Konstantinos Astonios, Kyriakos Panopoulos, Aggelos Doukelis, Antionos Koumanakos, Emmanouil Karakas, National Technical University of Athens

86. **Development of Poly(Amidoamine) Dendrimer/ Polyvinyl Alcohol Hybrid Membranes for CO₂ Capture at Elevated Pressures**
Shuhong Duan, Ikuo Taniguchi, Teruhiko Kai, Shingo Kazama, Research Institute of Innovative Technology for the Earth
87. **Modelling and Multi-Stage Design of Membrane Processes Applied to Carbon Capture in Coal-Fired Power Plants**
Davide Bocciardo, Maria-Chiara Ferrari, Setfano Brandani, Scottish Carbon Capture and Storage Centre
88. **CO₂ Removal from Multi-Component Gas Stream using Porous Ceramic Membranes Infiltrated with Molten Carbonates**
Marie-Laure Fontaine, Thijs Peters, Michael McCann, Partow P. Henriksen, Rune Bredesen, SINTEF Materials and Chemistry
89. **CO₂ Absorption with Membrane Contactors vs. Packed Absorbers-Challenges and Opportunities in Post Combustion Capture and Natural Gas Sweetening**
Karl Anders Hoff, SINTEF, Hallvard Svendsen, Norwegian University of Science and Technology
90. **Molecular Gate Membrane: Poly(Amidoamine) Dendrimer/Polymer Hybrid Membrane Modules for CO₂ Capture**
Teruhiko Kai, Ikuo Taniguchi Shuhong Duan, Shingo Kazama, Research Institute of Innovative Technology for the Earth (RITE)
91. **Optimization of CO₂ Concentration Captured by Membrane Technology - Possibility of Reduction in CO₂ Capture Energy and Cost**
Shingo Kazama, RITE; Kenji Haraya, AIST
92. **Membrane Systems Engineering for Post-Combustion Carbon Capture**
Rajab Khalilpour, Ali Abbas, University of Sydney
93. **The Effect of pH on CO₂-Separation from Post Combustion Gas by Polyvinylamine based Composite Membrane**
Taek-Joong Kim, Heléne Vrålstad, Marius Sandru, SINTEF Materials and Chemistry; May-Britt Hägg, NTNU
94. **Preparation of CO₂ Permselective Li₄SiO₄ Membranes by Using Mesoporous Silica as a Silica Source**
Mikihiro Nomura, Tesuya Saknishi, Youichiro Nishi, Keisuke Utsumi, Ryutaro Nakamura, Shibaura Institute of Technology

95. **Preparation of Thin Li₄SiO₄ Membranes by Using a CVD Method**
Mikihiro Nomura, Tesuya Saknishi, Youichiro Nishi, Keisuke Utsumi, Ryutaro Nakamura, Shibaura Institute of Technology
 96. **Benchmarking of Hydrogen Selective Membranes**
JAZ Pieterse, D. Jansen, J. Boon, JW Dijkstra, ECN
 97. **Dense Membranes for Efficient Oxygen and Hydrogen Separation (DEMOYS): Project Overview and First Results**
Pietro Pinacci, RSE; Jochen Haering, Sulzer Markets and Technology Ltd
 98. **Membrane – Solvent Absorption Hybrid Processes for Pre- and Post-Combustion Capture from Brown Coal Plants**
Colin Scholes, Robyn Cuthbertson, Geoff Stevens, Sandra Kentish; CRC for Greenhouse Gas Technologies (CO₂CRC)
 99. **CACHET-II: Carbon Capture and Hydrogen Production with Membranes**
Bai Song, Jonathan Forsyth, BP Alternative Energy
 100. **Effects of Membrane Properties on CO₂ Desorption from Chemical Absorbents using a Membrane Flash Process**
Nobuhide Takashi, Kei Matsuzaki, Tetsuya Funai, Takuya Wada, Hiroshi Fukunaga, Shinshu University; Toru Takatsuke, Hiroshi Mano, Research Institute of Innovative Technology for the Earth
 101. **Comparison and Selection of Amine-Based Absorbents in Membrane Vacuum Regeneration Process for CO₂ Capture with Low Energy Cost**
Zhen Wang, Mengxian Fang, Yili Pan, Zhongyang Luo, Zhejiang University; Shuiping Yan, Huazhong Agricultural University
 102. **Pore-Fill-Type Palladium-Porous Alumina Composite Membrane for Hydrogen Separation**
Katsunori Yogo, RITE, Chemical Research Group and NAIST; Hiromichi Takeyama, NAIST; Kensuke Nagata, RITE, Chemical Research Group
 103. **CO₂/CH₄ Mixed Gas Separation Using Carbon Hollow Fiber Membranes**
Miki Yoshimune, Kenji Haraya, AIST
 104. **The Effects of Membrane-Based CO₂ Capture System on Pulverized Coal Power Plant Performance and Cost**
Haibo Zhai, Edward Rubin, Carnegie Mellon University
 105. **Investigation of Cascaded Membrane Process for Real Flue Gas Simulation in Post-Combustion Capture**
Li Zhao, Michael Weber, Detlef Stolten, Forschungszentrum Juelich, Germany
 106. **Efficient Low CO₂ Emissions Power Generation by Mixed Conducting Membranes**
Paolo Chiesa, Matteom Romano, Vincenzo Spallina, David Turi, Politecnico di Milano; Luca Mancuso, Foster Wheeler
- Novel Separation**
107. **Carbon Dioxide Capture from Flue Gases by Solid Sorbents**
Mustafa Abunowara, Libyan Petroleum Institute; Mohammed Elgarni, HTC Purenergy Inc. Canada
 108. **Combined SO₂-CO₂ Removal Towards Significant Investment Cuts**
Cristina Sanchez Sanchez, Katarzyna Misiak, Monique Oldenburg, Earl Goetheer, TNO; Erik Meuleman, CSIRO
 109. **Development of New CO₂ Capture Processes Based on Phase Change Amino Acid Solvents**
Eva Sanchez Fernandez, Katarzyna Misiak, Earl Goetheer, Ferran de Miguel Mercader, TNO
 110. **Conception of a Pulverized Coal Fired Power Plant with Carbon Capture around a Supercritical Carbon Dioxide Brayton Cycle**
Yann Le Moullec, EDF R&D
 111. **Removal of Carbon Dioxide from Indoor Air Using a Cross-Flow Rotating Packed Bed**
Chia-Chang Lin, Chang Gung University
 112. **CO₂ Capture System Using Lithium Silicate for Distributed Power Supply**
Mamoru Mizunuma, Masayuki Tsuda, Yasuko Maruo, NTT Energy and Environment Laboratories; Takao Makagaki, Waseda University
 113. **Studies of Crosslinked Quaternized Biopolymer for Separation of Heat Stable Salts in Amine Absorption Solution for CO₂ Capture**
Chintana Saiwan, Chariya Seelarak, Chulalongkorn University; Teeradet Supap, Raphael Idem, Paitoon Tontiwachwuthikul, University of Regina; Panya Wongpanit, Srinakharinwirot University
 114. **Carbon Dioxide Separation Technology from Biogas by Membrane/Absorption Hybrid Method**
Takafumi Tomiokasakai, Toru Sakai, TAIYO NIPPON SANSO CORPORATION; Hiroshi Mano, RITE
 115. **Study of Heat Integration Between the Units of a Circulating Fluidized Bed Reactor Operating Sorption Enhanced Steam Methane Reforming**
Rafael Antonio Sanchez, Hugo Atle Jakobsen, Jannike Solsvik, Zhongxi Chao, Norwegian University of Science and Technology
 116. **Application of Free Piston Stirling Cooler (SC) on CO₂ Capture Process**
Chun Feng Song, Yutaka Kitamura, University of Tsukuba; Wei Zhong Jiang, China Agricultural University

117. **Amine Sorbents for Use in the Electrochemically-Mediated Gas Scrubbing of Carbon Dioxide**
Michael Stern, Fritz Simeon, Howard Herzog, Alan Hatton, Massachusetts Institute of Technology

118. **Synthesis of Calcium Aluminates Granule with TiO_2 Binder for High-Temperature CO_2 Capture**
Ching Tsung Yu, WEiChin Chen, Yau Pin Chyou, Institute of Nuclear Energy Research; San Yaun Chen, National Chiao Tung University

Oxyfuel Technologies

119. **Effect of Temperature and Flue Gas Recycle on the SO_2 and NO_x Emissions in a Oxyfuel Fluidised Bed Combustor**

Juan Adanez, Margarita de las Obras-Loscertales, Arancha Rufas, Luis Francisco de Diego, Francisco Garcia-Labiano, Pilar Gayan, Alberto Abad, Instituto de Carboquímica- CSIC

120. **Experimental Investigations on Deposit Formation on External Fluidized Bed Heat Exchanger Surfaces in Oxy-Fired CFB Boilers**
Theodor Beisheim, Mariusz Zieba, Günter Scheffknecht, IFK - University of Stuttgart

121. **Oxyfuel Combustion: Technical & Economic Considerations for the Development of Carbon Capture from Pulverized Coal Power Plants**
Kyle Borget, Edward Rubin, Carnegie Mellon University

122. **Retrofit of Bubbling Fluidized Boilers to Oxyfuel Combustion using Wood Wastes as Fuel**
Gabriel Faé Gomes, Liandro Dalla Zen, CIENTEC; Antônio Vilela, UFRGS

123. **Restrictions and Limitations for the Design of a Steam Generator for a Coal-Fired Oxyfuel Power Plant with Circulating Fluidised Bed Combustion**
Claas Guenther, Matthias Weng, Alfons Kather, Hamburg University of Technology

124. **Water Balance in Oxy-Combustion Compared with Post-Combustion Schemes**
Jens Hetland, SINTEF Energy Research

125. **Pathway for Advanced Architectures of Oxy-Pulverized Coal Power Plants: Minimization of the Global System Exergy Losses**
Yann Le Moullec, EDF R&D; Hayato Hagi, EDF R&D and Mines ParisTech CEP, Rodrigo Rivera-Tinoco, Chakib Bouallou, Mines ParisTech CEP

126. **Ignition and NO Emissions of Coal and Biomass Blends Under Different Oxyfuel Atmospheres**
Juan Rianza, Lucia Álvarez, Maria Victoria Gil, Cova Pevida, Jose J. Pis, Fernando Rubiera, INCAR-CSIC

127. **Predicting Behaviour of Coal Ignition in Oxyfuel Combustion**
Cahyadi Soeharto, University of Indonesia

128. **Impact of Oxyfuel Combustion on Fly Ash Transformations and Resulting Corrosive Behavior of Austenitic Superalloys**
Gosia (Malgorzata) Stein-Brzozowska, Hasbeidy Diaz Castro, Jörg Maier, Günter Scheffknecht, IFK, University of Stuttgart

129. **Flue Gas Concentrations and Efficiencies of a Coal-Fired Oxyfuel Power Plant with Circulating Fluidised Bed Combustion**
Matthias Weng, Claas Günther, Alfons Kather, Hamburg University of Technology / Institute of Energy Systems

Post Combustion

130. **Optimal Operation of Solvent-Based Post-Combustion Carbon Capture Processes**
Zhengxiong Li, Ali Abbas, Rajab Khalilpour, The University of Sydney

131. **Optimization of an Existing 130 Tonne per day CO_2 Capture Plant from a Flue Gas Slipstream of a Coal Power Plant**
Ahmed Aboudheir, Walid Elmoudir, HTC CO_2 Systems Corp.

132. **Process Simulation of Aqueous MEA Plants for Post-Combustion Capture from Coal-Fired Power Plants**
Hyungwoon Ahn, Stefano Brandani, Mauro Luberti, Zhengyi Liu, The University of Edinburgh

133. **Heat of Absorption of CO_2 in Aqueous Solutions of DEEA, MAPA and their Mixture**
Muhammad Arshad, Kaj Thomsen, Technical University of Denmark; Hallvard F. Svendsen, Norwegian University of Science and Technology

134. **Validation of a Process Model of CO_2 Capture in an Aqueous Solvent, using an Implicit Molecular Based Treatment of the Reactions**
Charles Brand, Javier Rodriguez, Amparo Galindo, George Jackson, Claire Adjiman, Imperial College London

135. **Selection of Amine Amino Acids Salt Systems for CO₂ Capture**
Arlinda Fejzo Ciftja, Adri Hartono, Hallvard F. Svendsen, NTNU
136. **Carbamate Formation in Aqueous - Diamine - CO₂ Systems with NMR Spectroscopy**
Arlinda Fejzo Ciftja, Adri Hartono, Hallvard F. Svendsen, NTNU
137. **eNRTL Parameter Fitting Procedure for Blended Amine Systems: MDEA-PZ Case Study**
Diego Di Domenico Pinto, Julianna, Garcia Moretz-Sohn Monteiro, Anita Bersås, Tore Haug-Warberg, Hallvard Fjøsne Svendsen, NTNU
138. **Aqueous Piperazine/Aminoethylpiperazine for CO₂ Capture**
Yang Du, Omkar Namjoshi, Le li, Thu Nguyen, Gary Rochelle, The University of Texas at Austin
139. **Study of the Post Combustion CO₂ Capture by Absorption into Amine(s) Based Solvents: Application to Cement Flue Gases**
Lionel Dubois, Diane Thomas, University of Mons
140. **Postcombustion CO₂ Capture by Chemical Absorption: Screening of Aqueous Amine(s)-Based Solvents**
Lionel Dubois, Diane Thomas, University of Mons
141. **A Numerical Solution Strategy for Dynamic Simulation of Post-Combustion CO₂ Capture**
Nina Enaasen, Andrew Tobiesen, Magne Hillestad, Norwegian University of Science and Technology; Hanne Kvamsdal, SINTEF Materials and Chemistry
142. **Thermal Decomposition of Nitrosamines in Aqueous Piperazine**
Nathan Fine, Mandana Ashouripashaki, Gary Rochelle, University of Texas, Austin
143. **Removal of Acid Gases and Metal Ion Contaminants from Power Plant Flue Gases with PostCapTM Technology**
Björn Fischer, Diego Andrés-Kuettel, markus Kinzl, Ralph Joh, Rüdiger Schneider, Siemens AG, Sector Energy
144. **Theoretical Study of Equilibrium Constants for CO₂ Capture Solvents**
Mayuri Gupta, Hallvard F. Svendsen, Norwegian University Of Science and Technology; Eirik Falck Da Silva, SINTEF Materials and Chemistry
145. **Mass Transfer Between Carbon Dioxide and Liquid Droplets formed by A Novel Experimental Set-Up**
Jingyi Han, Melaaen Morten, Eimer Dag, Tel-Tek
146. **Experimental and Modelling Study of the Binary and Ternary VLE of the AMP/Pz/H₂O System with Ebulliometer and NMR**
Ardi Hartono, Muhammad Saaed, Arlinda, Ciftja, Hallvard Svendsen, NTNU
147. **Development of a Dynamic Model of a Post Combustion CO₂ Capture Process**
Sanoja Jayarathna, Bernt Lie, Telemark University College, Morten Melaaen, Telemark University College and Tel-Tek
148. **Experimental Study on CO₂ Solubility in Aqueous Piperazine/Alkanolamines Solutions at Stripper Conditions**
Shota Inoue, Takuya Itakura, Takao Nakagaki, Yuki Furukawa, Waseda University; Hiroshi Sato, IHI Corporation; Yasuro Yamanaka, IHI Corporation
149. **Oxidative Degradation of Aqueous Amine Solutions of MEA, MDEA, AMP, PZ: A Review**
Klaus J. Jens, Telemark University College and Telemark Technological R & D Institute; Siw B. Fredriksen, Norner AS
150. **Advanced CO₂ Capture Process using MEA Scrubbing: Configuration of a Split Flow and Phase Separation Heat Exchanger**
Jaeheum Jung, Yeong Su Jong, Youngsub Lim, Chonghun Han, Seoul National University; Chi Seob Lee, KEPSCO Engineering & Construction Company, INC
151. **SO₃ Impact on Amine Emission and Emission Reduction Technology**
Takashi Kamijo, Yoshinori Kajiya, Hiromitsu Nagayasu, Mitsubishi Heavy Industries, Ltd.; Takahito Yonekawa, Tatsuya Tsujiuchi, Mitsubishi Heavy Industries America, Inc.
152. **Demonstration of Hitachi's CO₂ Capture System for Flue Gas from Power Plants**
Terafumi Kawasaki, Yoshiro Inatsune, Kengo Sano, Hitachi Ltd.; Toshio Katsube, Jun Shimamura, Babcock-Hitachi K.K.
153. **Vacuum Regeneration of Amine Solvent for Post-Combustion Carbon Capture with Compression Train Integration: a Way Forward?**
Yann Le Moullec, EDF R&D
154. **Improved Flow Scheme and Operational Parameters for Amine-Based CO₂ Capture Processes: A Rigorous Optimization Approach**
Yann Le Moullec, Thibaut Neveux, EDF R&D; Jean Pierre Corriou, Eric Favre, LRG
155. **Oxidative Degradation of Alkanolamines with Inhibitors in CO₂ Capture Process**
In-Young Lee, No-Sang Kwak, Ji-Hyun Lee, Jae-Goo Shim, Kyung-Ryung Jang, Korea Electric Power Corporation

156. **Rate Based Modeling of Chilled Ammonia Process (CAP) in Aspen Plus®**
Mu Li, Eddie Vuddagiri, Xi Chen, Rameshwar Hiwale, Frederic Vitse, Alstom Power Carbon Capture R&D Execution
157. **Experimental Study of Energy Requirement of CO₂ Desorption from Rich Solvent**
Xiaofei Li, Shujuan Wang, Changhe Chen, Tsinghua University
158. **Modelling, Simulation and Pilot-Plant Validation of CO₂ Capture Process Using Amine Absorbent for Coal Based Power Plant in South Korea**
Youngsub Kim, Ung Lee, Yeong Su Jeong, Seeyub Yang, Jeongnam Kim, Chonghun Han, Seoul National University; Chi Seob Lee, Jaehyoung Kim, KEPCO E&C
159. **Representation of Piperazine-CO₂-H₂O System Using Extended-UNIQUAC and Computational Chemistry**
Hamid Mehdizadeh, Mayuri Gupta, Hallvard F. Svendsen, Norwegian University of Science and Technology; Eirick Flack da Silva, SINTEF
160. **Activity-Based Kinetics of the Reaction of Carbon Dioxide with Aqueous Amine Systems. Case Studies: MAPA and MEA**
Juliana Monteiro, Diego Pinto, Xiaso Luo, Hanna Knuutila, Ardi Hartono, Saddam Hussain, Emmanuel Mba, Hallvard Svendsen, NTNU
161. **IHI's Amine-Based CO₂ Capture Technology for Coal Fired Power Plant**
Shiko Makamura, Yasuro Yamanaka, Toshiya Matsuyama, Shinya Okuno, Hiroshi Sato, IHI Corporation
162. **Thermal Degradation of Piperazine Blends with Diamines**
Omkar Namjoshi, Le Li, Yang Du, Gary Rochelle, The University of Texas at Austin
163. **Piperazine Degradation in Pilot Plants**
Paul Nielsen, Lynn Li, Gary Rochelle, The University of Texas at Austin
164. **Development of Carbon Dioxide Removal System from the Flue Gas of Coal Fired Power Plant**
Yukio Ohashi, Takashi Ogawa, Toshihisa Kiyokuni, Toshiba Corporation
165. **Laboratory Rig for Atmospheric CO₂ Absorption and Desorption Under Pressure**
Lars Erik Øi, Joachim Lundberg, Morten Pedersen, Per Morten Hansen, Morten Christian Melaaen, Telemark University College
166. **Babcock & Wilcox Power Generation Group's RSAT™ Process and Field Demonstration of the OptiCap™ Advanced Solvent at the National Carbon Capture Center**
Christopher Poling, Ted Parsons, Jeb Geyheart, Stephen Moorman, Babcock & Wilcox Power Generation Group
167. **Development of a Rate-Based Model for CO₂ Absorption Using Aqueous NH₃ in a Packed Column**
Guojie Qi, CSIRO and Tsinghua University; Hai Yu, Paul Feron, CSIRO; Shujuan Wang, Chnaghe Chen, Tsinghua University
168. **The Impact of Design Correlations on Rate-Based Modeling of a Large Scale CO₂ Capture with MEA**
Neda Razi, Hallvard Svendsen, Olav Bolland, Norwegian University of Science and Technology
169. **Modeling Pilot Plant Performance of an Absorber with Aqueous Piperazine**
Darshan Sachde, Jorge Plaza, Eric Chen, Gary Rochelle, The University of Texas at Austin
170. **Equilibrium of MEA, DEA, MDEA and AMP with Bicarbonate and Carbamate: A Raman Study**
Gamunu Lasantha Samarakoon Samarakoon Perumbuli Arachchige, Klaus Jens, Telemark University College; Niels Andersen, University of Oslo
171. **Multivariate Data Analysis for Parameters' Effect on CO₂ Removal Efficiency**
Udara Arachchige, Neelakantha Ayral, Pramod Ghimire, Maths Halstensen, Morten Melaaen, Telemark University College, Porsgrunn, Norway
172. **Vapour-Liquid Equilibrium for Novel Solvents for CO₂ Post Combustion Capture**
Anastasia Trollebø, Muhammad Saeed, Hallvard Svendsen, The Norwegian University of Science and Technology; Inna Kim, SINTEF Materials and Chemistry

173. **Measurement and Calculation of CO₂ Solubility and Absorption Kinetic Rate in Aqueous Solutions of TEDA and DMEA**
Chuan Tong, Carlos Cebamanos Perez, Yanmei Yu, Jian Chen, Tsinghua University; Jose Carlos Valle Marcos, EDF Beijing R&D Center, Yan Le Moullec, Fabrice Chopin, EDF R&D
174. **Post Combustion CO₂ Capture Using Supportec Amine Sorbents: High Pressure Regeneration**
Rens Veneman, Sascha Kersten, Eim Brilman, University of Twente
175. **Process Control Strategies for CO₂ Regeneration in a 2-Stage Flash**
Matthew Walters, Ricardo Dunia, Thomas Edgar, Gary Rochelle, University of Texas at Austin; Christopher Hundham, Technische Universität München
176. **A Hybrid Separation Process for the Recovery of Carbon Dioxide from Flue Gases**
Krzysztof Warmuzinski, Marek Tanczyk, Manfred Jaschik, Aleksandra Janusz-Cygan, Polish Academy of Sciences
177. **Dynamic Simulation of Post-Combustion Capture System**
Zhaofeng Xu, Yali Xue, Zheng Li, Tsinghua University; Yongqi Lu, University of Illinois at Urbana-Champaign
178. **CO₂ Absorption by Using a Low-Cost Solvent: Biogas Slurry Produced by Anaerobic Digestion of Biomass**
Shuiping Yan, Liqiang Zhang, Ping Ai, Yuanyuan Wang, Yanlin Zhang, Huazhong Agricultural University
179. **A Study of Mass Transfer Kinetics of Carbon Dioxide in (Monoethanolamine + Water) by Stirred Cell**
Jiru Ying, Telemark Technological R&D Institute; Dag A. Eimer, Telemark University College
180. **Hitachi's Carbon Dioxide Scrubbing Technology with H3-1 Absorbent for Coal Fired Power Plants**
Koichi Yokoyama, Miho Honoki, Eiji Miyamoto, Shigehito Takamoto, Hirofumi Kikkawa, Babcock-Hitachi K. K. Kure Research Laboratory; Brandon Pavlish, EERC; Takanori Nakamoto, Toshio Katsube, Babcock-Hitachi K. K. Kure Division; Terufumi Kawasaki, Hitachi Ltd; Song Wu, Hitachi Power Systems America, Ltd
181. **Improved Hydrotalcite-Type Compounds for Post-Combustion CO₂ Abatement**
Emiliana Dvininov, Hazel Stephenson, MEL Chemicals; Holly Krutka, ADA Environmental Solutions

Pre Combustion

182. **Detailed Process Simulation of Pre-Combustion IGCC Plants using Coal-Slurry and Dry Coal Gasifiers**
Hyungwoong Ahn, Stefano Brandani, Zoe Kapetaki, The University of Edinburgh
183. **Low-Temperature CCS from an IGCC Power Plant and Comparison with Physical Solvents**
David Berstad, Rahul Anantharaman, Petter Nekså, SINTEF Energy Research
184. **Elevated Temperature Adsorption Characteristics of K-Promoted Hydrotalcites for Pre-Combustion Capture of Carbon Dioxide**
Shuang Li, Yixiang Shi, Ningsheng Cai, Tsinghua University
185. **Overview of, and Experimental Methodology for, Sorption Enhanced Hydrogen Production**
Alissa Cotton, Kumar Patchigolla, John E. Oakley, Cranfield University
186. **SEWGS Knocks Down Capture Costs by 40%; Technology is Now Ready for Scale-Up**
Daniel Jansen, Edward van Selow, Paul Cobden, ECN; Giampaolo Manzolini, Ennio Macchi, Matteo Gazzani, Politecnico di Milano; Richard Blom, Partow Henriksen, SINTEF; Rich Beavis, BP; Andrew Wright, Air Products PLC
187. **Solubility of Carbon Dioxide in 1-Butyl-3-Methylimidazolium Phenolate**
Ki Tae Park, Jung Hoon Park, Soo Hyun Choi, Seong-Pil Kang, Il-Hyun Baek, Korea Institute of Energy Research
188. **Multi-Level Dynamic Simulation of Elevated Temperature Pressure Swing Adsorption System for Pre-Combustion CO₂ Capture**
Yan Zheng, Yixiang Shi, Ningsheng Cai, Shuang Li, Tsinghua University
189. **Improving a Pre-Combustion CCS Concept in Gas Turbine Combined Cycle for CHP Production**
Marjut Suomalainen, Antti Arasto, VTT Technical Research Centre of Finland; Sari Siitonen, Gasum Oy
190. **Fundamental Modelling of a Membrane Reactor with in situ Hydrogen Separation and Combustion**
Torleif Weydahl, Andrea Gruber, SINTEF Energy Research; Prashant S. Samilath, NTNU

Retrofitting

191. **The Techno-Economic Prospect of Retrofitting Natural Gas Combined Cycle Power Plants in China: a Case Study of CCGT Power Plants in Huizhou and Shenzhen, Guangdong**
Jia Li, Jon Gibbins, University of Exeter; Mathieu Lucquiaud, University of Edinburgh; David Reiner, University of Cambridge; Di Zhou, Chinese Academy of Sciences

Techno-Economic Comparisons

192. **Evaluation of CO₂ Purification Requirements and the Selection of Processes for Impurities Deep Removal from the CO₂ Product Stream**
Zeina Abbas, Mohammad Abu Zahra, Toufic Mezher, Masdar Institute of Science and Technology
193. **Evaluation of Performance and Cost of Combustion Based Power Plants with CO₂ Capture in the UK**
Elena Catalanotti, Kevin Hughes, Richard Porter, Mohamed Pourkashanian, University of Leeds; John Price, Centre for Low Carbon Futures
194. **Evaluation and Comparison of the Part Load Behaviour of the CO₂ Capture Technologies Oxyfuel and Post-Combustion**
Volker Roeder, Christopher Hasenbein, Alfons Kather, Hamburg University of Technology
195. **Techno-Economic Evaluation of an Advanced Solid Sorbent-Based CO₂ Capture Process for Natural Gas Combined Cycle Power Plants**
Adel Seif El Nasr, Mohammad Abu Zahra, Masdar Institute of Science and Technology; Thomas Nelson, RTI International

Other

196. **Addressing Technology Uncertainties in Power Plants with Post-Combustion Capture**
Mathieu Lucquiaud, Hannah Chalmers, Olivia Errey, Jon Gibbins, The University of Edinburgh; Xi Liang, University of Exeter
197. **The Role of SO_x in the Chemistry of Amine-Based CO₂ Capture in PCC**
Yaser Beyad, Robert Burns, Marcel Maeder, University of Newcastle; Graeme Puxty, CSIRO Energy Technology

198. **Dynamic Measurements of CO₂ Flow in Water Saturated Porous Medium at Low Temperature Using MRI**
Mingjun Yang, Yongchen Song, Ningjun Zhu, Yuechao Zhao, Dalian University of Technology

CO₂ Utilisation Options

CO₂ for Enhanced Geothermal

199. **CO₂ Utilization for Enhanced Geothermal Energy Recovery: Effects of Salt Precipitation in a Fractured Reservoir**
Andrea Borgia, Karsten Pruess, Timothy Kneafsey, Lehua Panm Curtis Oldenburg, Lawrence Berkeley National Laboratory
200. **Geothermal Energy Production at Geologic CO₂ Sequestration Sites: Expanding Opportunities for Renewable Power and CCS**
Jimmy Ranpolph, University of Minnesota and Heat Mining Company, LLC; Ben Adams, Thomas Kuehn, Martin Saar, Jeffrey Bielicki, Melissa Pollak, Nathan Paine, University of Minnesota, Steven Taff, Geological Storage Consultants, LLC
201. **Numerical Investigation of Enhanced Geothermal System with CO₂ as Working Fluid**
Feng Luo, Ruina Xu, Peixue Jiang, Beijing Key Laboratory of CO₂ Utilization and Reduction Technology and Tsinghua University
202. **Potential Global Implications of Gas Production from Shales and Coal for CO₂ Geological Storage**
Michael Godec, Hunter Jonsson, Advanced Resources International, Inc.; Ludmilla Basava-Reddi, IEAGHG

CO₂ Use for Production of Algae or Chemicals

203. **Valorization of CO₂ by Co-Electrolysis of CO₂/H₂O at High Temperature for Syngas Production**
Chakib Bouallou, Youness El Fouih, Youssef Redissi, ARMINES MINES ParisTech, CEP
204. **Recycling of Carbon Dioxide to Produce Ethanol**
Chakib Bouallou, Youness El Fouih, ARMINES MINES ParisTech, CEP
205. **New Methodologies for the Integration of Power Plants with Algae Ponds**
Earl Goetheer, Peter Van den Broeke, Sven Van der Gijp, Rob Van de Stel, TNO

206. **Development of a Process for Aqueous Mineral Carbonation on Municipal Solid Waste Incinerator Bottom Ash with Recovery of Useful Chemicals**

Shuji Hamano, Satoshi Okumura, Tsunehira Yamamoto, Mamoru Kondo, Hitachi Zosen Corporation

207. **Turning CO₂ into Valuable Chemicals**

Oluwafunmilola Ola, Mercedes Moroto-Valer, Sarah Mackintosh, NCCCS, CICC, University of Nottingham

208. **A Study of Carbonate Synthesis from CO₂ in Combustion Exhaust Gas**

Hideki Shintaku, Tetsuya Takemoto, Shinichi Kwawasak, OSAKA GAS CO., LTD.; Fumihiro Hanasak, KRI, Inc.

ECBM

209. **Geo-Sequestration of CO₂ in the Coal Seams, with Special References to the Effects of Coal Swelling on the Permeability**

Ferian Anggara, Kyushu University and Gadjah Mada University; Kyuro Sasaki, Yuichi Sugai, Kyushu University

210. **Two Phase Relative Permeability of Gas and Water in Coal for Enhanced Coalbed Methane Recovery and CO₂ Storage**

Sevket Durucan, Mustafa Ahsan, Amer Syed, Ji-Quan Shi, Anna korre, Imperial College London

211. **Coal-Seq III Consortium: Advancing the Science of CO₂ Sequestration in Coal Seam and Gas Shale Reservoirs**

George Koperna, Anne Oudinot, Advanced Resources International, Inc.; Satya Harpalani, Southern Illinois University; Khaled Gasem, Oklahoma State University, Ian Palmer, Higgs-Palmer Technologies

212. **Adsorption Model Equation for Multi-Component Gas on Coalbed and its Assessment**

Kei Tanaka, Sohei Shimada, The University of Tokyo; Naito Sakimoto, National Institute of Advanced Industrial Science and Technology

EOR

213. **Monitoring and Modeling CO₂ Behavior in Multiple Oil Bearing Carbonate Reefs for a Large Scale Demonstration in Northern Lower Michigan**

Neeraj Gupta, Lydia Cumming, Mark Kelley, Darrell Paul, Srikanta Mishra, Jaqueline Gerst, Matt Place, Battelle; Rick Aprdini, Allen Modroo, Robert Mannes, Core Energy LLC

214. **Geologic Carbon Sequestration through Enhanced Oil Recovery**

Bruce Hill, Clean Air Task Force; Susan Hovorka, University of Texas, Texas Bureau of Economic Geology; Steve Melzer, Melzer Consulting

215. **Densities and Excess Volumes of CO₂ Decane Solution from 12 to 18MPa and 313 to 343K**

Wei-wei Jian, Yi Zhang, Yong-Chen Song, Key Dalian University of Technology

216. **A Feasibility Study of the Integration of Enhanced Oil Recovery (CO₂ Flooding) with CO₂ Storage in the Depleted Oil Fields of the Ordos Basin, China**

Zunsheng Jiao, Ronald Surdam, University of Wyoming Carbon Management Institute; Ruimin Gao, Research Institute of the Yanchang Petroleum (Group) Co., LTD; Lifa Zhou, Yajun Wang, Tingting Luo, Shaanxi Provincial Institute of Energy Resources and Chemical Engineering

217. **Simulation of CO₂-Oil Minimum Miscibility Pressure (MMP) for CO₂ Enhance Oil Recovery (EOR) and CO₂ Storage using Neural Networks**

Zhiwu Liang, Paitoon Tontiwachwuthikul, Teerawat sema, Peng Luo, Hunan University and University of Regina; Ruimin Gao, Research Institute of the Yanchang Petroleum (Group) Co., LTD; Fanhua Zeng, University of Regina; Xiangzeng Wang, Shaanxi Yanchang Petroleum (Group) Corp. Ltd.

218. **Pore Level Visualisation and Simulation of CO₂ Miscible Injection with Gravity Domination**

Zeeshan Mohiuddin, The University of Adelaide

219. **Integrated CCS Aspect into CO₂ EOR Project Under High Range of Reservoir Properties and Operating Plans**

Vitsarut Attavitkamthorn, Javier Vilcáez, Kozo Sato, The University of Tokyo

220. **Measurement of Immiscible CO₂ Flooding Processes and Permeability Reduction due to Asphaltene Precipitation by X-ray CT Imaging**

Tonglei Wang, Yongchen Song, Yuechao Zhao, Yu Liu, Ningjun Zhu, Key Laboratory of Ocean Energy Utilization and Energy Conservation of the Ministry of Education

221. **Research Progress of the Interfacial Tension in Supercritical CO₂-Water/Oil System**

Wanli Xing, Yi Zhang, Yongchen Song, Dalian University of Technology

222. **CO₂ Miscible Simulation for Magnetic Resonance Imaging Coreflood Tests**

Wenzhe Yang, Yongchen Song, Yu Liu, Wei-Haur Lam, Yuechao Zhao, Ningjun Zhu, Lanlan Jiang, Dalian University of Technology

223. Visualisation of Water Flooding and Subsequent Supercritical CO₂ Flooding in Fractured Porous Media with Permeability Heterogeneity Using MRI

Yuechao Zhao, Tonglei Wang, Yongchen Song Yu Liu, Min Hao, Ningjun Zhu, Dalian University of Technology

224. Experiment Study on CO₂/Water Two Phase Flow in Porous Medium Using Magnetic Resonance Imaging

Lanlan Jiang, Yongchen Song, Mingjun Yang, Yu Liu, Ningjun Zhu, Dalian University of Technology

225. Magnetic Resonance Imaging Study of the Miscibility of Supercritical CO₂ and n-decane in Porous Media

Ningjun Zhu, Yongchen Song, Yu Liu, Yuechao Zhao, Lanlan Jiang, Tonglei Wang, Hongfei Zheng, Dalian University of Technology

Other

226. Supercritical Carbon Dioxide as Green Product for Effective Environmental Remediation

Abdulla Elhenshir, Libyan Petroleum Institute; Abeer Subkha, National Oil Corporation

227. Carbon Utilization to meet California's Climate Change Goals

Elizabeth Burton, John Henry Beyer, Lawrence Berkeley National Laboratory; William Bourcier, Lawrence Livermore National Laboratory; Kevin O'Brien, Energy Commercialization, LLC; Niall Mateer, University of California; John Reed, Kiverdi, Inc.

228. Economic and Market Analysis of CO₂ Utilisation Technologies - Focus on CO₂ Derived from North Dakota lignite

Jason Laumb, Robert Cowan, Alexander Azenkeng, Loreal Heebink, Sheila Hanson, Melanie Jensen, Peter Letvin, Laura Raymond, EERC

229. Mineral Carbonation for Carbon Sequestration with Industrial Waste

Myoungwook Mun, Heechan Cho, Seoul National University

230. Electromethanogenic CO₂ Conversion by Subsurface-Reservoir Microorganisms

Yoshihiro Kuramochi, Qian Fu, Hajime Kobayashi, Hideao Kawaguchi, Javier Vilcáez, Kozo Sato, Masayuki Ikarashi, Tatsuki Wakayama, Haruo Maeda, The University of Tokyo

231. Mechanism of Electromethanogenic Reduction of CO₂ by a Thermophilic Methanogen

Yutaka Onaka, Masahiro Hara, Hajime Kobayashi, Qian Fu, Hideo Kawaguchi, Javier Vilcáez, Kozo Sato, The University of Tokyo

Commercial Issues

Commercial Relationships

232. Optimal Contracts for Integrated CCS-EOR Projects

Anna Agarwal, Massachusetts Institute of Technology

Finance

233. Develop a Decision-Framework for Managing CCS Investment Flexibilities in Fossil Fuel Power Plants through Stochastic System Dynamic Programming

Xi Liang, Mathieu Lucquiaud, Jon Gibbins, University of Edinburgh; Jia Li, College of Engineering, Mathematics, Physical Sciences

234. Investment Decisions Under Uncertainty: CCS Competing Green Energy Technologies

Wilko Rohlf, RWTH Aachen University; Reinhard Madlener, E.ON Energy Research Center and RWTH Aachen University

Value Chain

235. Value Chain Analysis of CO₂ Storage by using the ECCOTool: A Case Study of the Dutch Offshore

Daniel Loevre, Filip Neele, TNO, Chris Hendriks, Joris Koornneef, Ecofys

Other

236. Selection of Optimal CO₂ Capture Plant Capacity for Better Investment Decisions

Rahul Anantharaman, Simon Rousannaly, Snorre Westman, Jo Husebye, SINTEF Energy Research

Demonstration Projects and Major International and National CCS Research, Development and Demonstration Programs

Development of Best Practice Guidelines

237. U.S. DOE's Efforts to Promote Knowledge Sharing Opportunities from the R&D Efforts: Development of the U.S. National Atlas and Carbon Storage Best Practice Manuals

John Litynski, Andrea Mcnemar, Traci Rodosta, Dawn Deel, U.S. DOE NETL; Derek Vikara, Ram Srivastava, Keylogic Systems; Larry Meyer, Robert Kane, Leonardo Technologies, Inc.

Experiences

238. **Overview of the CO₂CRC Otway Residual Saturation and Dissolution Test**
Lincoln Paterson, Tess Dance, Jonathan Ennis-King, Charles Jenkins, Linda Stalker, CO₂CRC/CSIRO Earth Science and Resource Engineering; Chris Boreham, Ralf Haese, CO₂CRC/Geoscience Australia; Mark bunch, CO₂CRC/University of Adelaide; Barry Freifeld, Yinqi Zhang, Lawrence Berkeley National Laboratory; Matthias Raab, Rajindar Singh, CO₂CRC
239. **Development of Conceptual Design for Commercial-Scale Geologic Storage and Monitoring System at American Electric Power Mountaineer Plant**
Neeraj Gupta, Mark Kelley, Rodney Osborne, Mark Moody, Srikanta Mishra, Jacqueline Gerst, Erica Howat, Battelle; Charlotte Sullivan, Battelle Pacific Northwest Division; Gary Spitznogle, Indra Bhattacharya, Mike Hammond, American Electric Power
240. **Regulating Pilot CCS Projects in Parallel to Developing Legislation Based on the CO₂CRC Otway Project Experience**
Namiko Ranasinghe, Department of Primary Industries
241. **Project Update of 500 TPD Demonstration Plant for Coal-Fired Power Plant**
Takuya Hirata, Hiromitsu Nagayasu, Takashi Kamijo, Yasuo Kubota, Mitsubishi Heavy Industries, Ltd; Tatsuya Tsujiuchi, Takahito Yonekawa, Paul Wood, Mitsubishi Heavy Industries America, Inc; Michael Ivie, Nick Irvin, Southern Company Services, Inc

Lessons Learnt

242. **Aspects of the Storage Permit Application for CO₂ Storage in the Depleted P18-4 Gas Field Offshore The Netherlands**
Andreas Kopp, ROAD, Maasvlakte CCS Project C.V. and E.ON Gas Storage GmbH; Menno Ross, Tom Jonker, ROAD, Maasvlakte CCS Project C.V.; Chris Gittins, Willem-Jan Plug, TAQA Energy BV
243. **The SECARB Anthropogenic Test: Status from the Field**
George Koperna, Vello Kuuskraa, David Reisenberg, Advanced Resources International, Inc.; Richard Rhudy, Robert Trautz, EPRI; Jerry Hill, Southern States Energy Board; Richard Esposito, Southern Company
244. **What Have We Learnt from Operational CCS Demonstrations - Phase 1b**
Samantha Neades, Tim Dixon, IEAGHG; Michael Haines, COFree Technologies

245. **Lacq-Rousse CO₂ Capture and Storage Demonstration Pilot: Lessons Learnt from Reservoir Modeling Studies**
Sylvian Thibeau, Daniel Avila, Pierre Chiquet, Catherine Prinet, Marc Lescanne, TOTAL

246. **How to Monitor Subsurface CO₂: Lessons from the IEAGHG Weyburn-Midale CO₂ Monitoring and Storage Project**
Donald White, Geological Survey of Canada

Program Overviews

247. **The South African Centre for Carbon Capture and Storage – Delivering CCS in the Developing World**
Brendan Beck, Tony Surridge, Sibbele Hietkamp, South African Centre for CCS
248. **The CLIMIT Programme and its Strategy for Norwegian Research, Development and Demonstration of CCS Technology**
Svein G. Bekken, Klaus Schöffel, Ståle Aakenes, Torre Hatlen, Gassnova SF; Åse Slagtern, Research Council of Norway; Lars Erik Øi, Telemark University College
249. **Latest CO₂ Transport, Storage and Monitoring R&D Progress in Republic of Korea: Offshore Geologic Storage**
Cheol Huh, Seong-Gil Kang, Korea Ocean Research and Development Institute; Myong-Ho Park, Korea National Oil Corporation; Jung-Seok Lee, NeoEnBiz Co
250. **U.S. DOE's R&D Program to Develop Infrastructure for Carbon Storage: Overview of the Regional Carbon Sequestration Partnerships and Other R&D Field Projects**
John Litynski, Traci Rodosta, U.S. DOE NETL; Derek Vikara, Ram Srivastava, Keylogic Systems
251. **The CO₂ Capture Project – Status and Prospects of the Capture Program**
Ivano Miracca, Saipem S.p.A. (Eni); Mark Crombie, Jonathan Forsyth, BP Alternative Energy International Ltd.; Cliff Lowe, Chevron Energy Technology Company; Gustavo Torres Moure, Petrobras - CENPES; Mahesh Iyer, Shell International Exploration & Production Inc.; Mark Bohm, Suncor Energy Services Inc.
252. **BIGCCS Centre - Supporting Large-Scale CCS Implementation**
Mona J. Mølnvik, SINTEF Energy Research
253. **Large-Scale CO₂ Capture Demonstration Plant Using Fluor's Econamine FG Plus(sm) Technology at NRG's WA Parish Electric Generating Station**
Jeffrey Scherffius, Satish Reddy, Fluor Enterprises, Inc.; John Klumpy, Anthony Armprister, NRG Energy, Inc.

254. Developing CCS into a Realistic Option in a Country's Energy Strategy

Daniel Sutter, Mischa Werner, Alba Zappone, Marco Mazotti, Institute of Process Engineering, ETH Zurich

255. Tomakomai CCS Demonstration Project in Japan

Daiji Tanase, Takashi Sasaki, Toru Yoshii, Satoshi Motohashi, Yoshihiro Sawada, Satoshi Aramake, Yoshinori Yamanouchi, Tomoyuki Tanaka, Shiro Ohkawa, Ryuichi Inowaka, Japan CCS Co., Ltd.

256. Innovative Zero-Emission Coal Gasification Power Generation Project

Tasuhiro Yamauchi, Katsuya Akiyama, New Energy and Industrial Technology Development Organization

257. Chilled Ammonia Process Installed at the Technology Center Mongstad

Staffan Jönsson, Vauhini Telikapalli, Alstom

Public-Private Partnerships

258. Amine Thermal Reclamation; Technology Development from Lab to Large-Scale Pilot Testing

Oddvar gorset, Vibeke Andersson, Aker Clean Carbon

259. OCTAVIUS: A New FP7 Project Demonstrating CO₂ Capture Technologies

Paul Broutin, IFPEN; Hanne Kvamsdal, SINTEF Materials and Chemistry; Cristiana La Marca, ENEL; Peter van Os, TNO; Nick Booth, E-ON New Building and Technology

260. Geochemical Assessment of the Injection of CO₂ into Rouse Depleted Gas Reservoir Part I: Initial Mineralogical and Geochemical Conditions in the Mano Reservoir

Sylvain Thibeau, Pierre Chiquet, Marc Lescanne, Catherine Prinet, TOTAL

261. Geochemical Assessment of the Injection of CO₂ into Rouse Depleted Gas Reservoir Part II: Geochemical Impact of the CO₂ Injection

Jean-Pierre Girard, Sylvain Thibeau, Pierre Chiquet, Marc Lescanne, Catherine Prinet, TOTAL

262. Preinjection Reservoir Fluid Characterization at a CCS Demonstration Site: Illinois Basin – Decatur Project, USA

Randall Locke II, Bracken Wimmer, Abbas Iranmenesh, Ivan Krapac, Illinois State Geological Survey, David Larssen, Walter Salden, Christopher Patterson, Schlumberger Water Services; Jim Kirksey, Schlumberger Carbon Services

263. CO₂ Storage at the Ketzin Pilot Site, Germany: Fourth Year of Injection, Monitoring, Modelling and Verification

Sonja Martens, Axel Liebscher, Fabian Möller, Jan Henningses, Thomas Kempka, Stefan Lüth, Ben Norden, Bernhard Prevedel, Martin Zimmer, Michael Kühn, A. Szizybalski, GFZ German Research Centre for Geosciences

264. The Lacq Industrial CCS Reference Project (France)

Jacques Monne, Marc Lescanne, Samuel Lethier, Catherine Prinet, TOTAL E&P

265. On Potential Showstoppers for Carbon Capture and Storage (CCS) in South Africa

Ronald Munyai, Brendan Beck, Tony Surridge, South African Centre for Carbon Capture and Storage

266. EnBW's Post-Combustion Capture Pilot Plant at Heilbronn – Results of the First Year's Testing Programme

Alexander Rieder, Sven Unterberger, EnBW Kraftwerke AG

267. Pilot Scale Testing of Polymeric Membranes for CO₂ Capture from Coal Fired Power Plants

Marius Sandru, Taek-Joon Kim, SINTEF Materials and Chemistry; Weislaw Capala, ICHP Research Institute; Martin Huijbers, KEMA; May-Britt Hägg, NTNU

268. Doosan Power Systems OxyCoal™ Burner Technology Development

David Sturgeon, Jim Rogerson, Gerry Hesselmann, Doosan Power Systems

269. The Proposed CO₂ Test Injection Project in South Africa

Ceri Vincent, Sam Holloway, British Geological Survey; David van der Spuy, Petroleum Agency South Africa; Jurie Viljoen, Magda Roos, Martinus Cloete, Council for Geoscience; Robert Tippmann, Climatekos; Andrew Gilder, IMBEWU Sustainability Legal Specialists (Pty) Ltd; Brendan Beck, South African Centre for Carbon Capture and Storage; Frank van Bergen, TNO

Education

Experiences

270. **CO₂ Injection for Geological Storage: A Series of Activities for Training Professionals and Educating Students in Geological Carbon Storage**
Hilary Olson, Steven L. Bryant, Jon E. Olson, Iona Williams, The University of Texas at Austin
271. **Meeting the Grand Challenge for Future Carbon Management Engineers and Scientists: Stimulating Workforce Capacity through Teacher Professional Development**
Hilary Olson, Steven L. Bryant, Jon E. Olson, Larry Lake, The University of Texas at Austin
272. **A Showcase for Geological CO₂ Storage – Replacing Misconceptions by Visual Explanations**
Mischa Werner, Daniel Sutter, Andreas Krättli, Özkan Lafci, Robin Mutschler, Pascal Oehler, Jan Winkler, Marco Mazzotti, ETH Zurich

Reviews

273. **NMR Studies on Amine-CO₂-H₂O Systems in PCC: A Review**
Cristina Perinu, Klaus-Joachim Jens, Telemark University College; Bjørnar Arstad, SINTEF

Developments in Geological Storage

CO₂ Injectivity

274. **Determination of Stress Dependent CO₂-Brine Relative Permeabilities of Low Permeable Rocks**
Ardy Arsyad, Yasuhiro Mitano, Hiro Ikemi, Civil and Structural Engineering Department; Tayfun Babadagli, School of Petroleum Eng. University of Alberta Canada; Kyuro Sasaki, School of Petroleum Eng. Kyushu University Japan
275. **A New Mathematical Model for Predicting CO₂ Injectivity**
Ehsan Azizi, Yildiray Cinar, The University of New South Wales and CO2CRC
276. **Thermal Modeling in and Around a CO₂ Injector**
Binglu Ruan, Ruina Xu, Peixue Jiang, Tsinghua University; Lingli Wei, Shell (China) Limited
277. **A Unified Formula for Determination of Wellhead Pressure and Bottom-Hole Pressure**
Mingze Liu, Bing Bai, Xiaochun Li, Chinese Academy of Sciences
278. **Evaluation of CO₂ Underground Behavior from Injectors Time-Lapse Pressure Fall Off Analysis: a Case Study of CO₂ Aquifer Storage Project**
Mayu Otake, INPEX Corporation

279. **CO₂ Injection for EOR in a Middle-East Carbonate Reservoir: Potential Impairment of Injectivity due to Salt Precipitation**

Holger Ott, Jeroen Snippe, Kees de Kloe, Shell Global Solutions International; Hisham Husain, Ali Abri, PDO

280. **Precipitation of Salt in Bentheimer Sandstone Induced by CO₂ Injection: MicroCT study**
Aprick van Hemert, Saskia Roels, Pacelli Zitha, Delft University of Technology

281. **Numerical Investigation for Enhancing CO₂ Injectivity for the Shenhua Erdos CCS Demonstration Project**
Keni Zhang, Yaqin Xu, Lulu Ling, Yang Wang, Litang Hu, Beijing Normal University

282. **Experimental Study of the Injection System for Demonstration Project of CO₂ Geologic Storage**
Byoung-Woo Yum, KIGAM; Soek Ho Yoon, Kong Hoon Lee, Jungho Lee, Young Kim, KIMM

283. **Injection pump for CCS**
Shigeru Yoshikawa, EBARA Corporation

Costs - Storage Related

284. **Cost Estimates for the CO₂ Geological Storage in Deep Saline Aquifers Offshore Japan: a Case Study**
Masato Takagi, Kazuo Koide, Junichi Shimizu, RITE; Chikara Iwamoto, Nippon Steel Engineering Co. Ltd.; Masao Ohoka, Seiichi Ikeda, Hiroyuki Azuma, Oyo Corporation

Environmental Impacts of CO₂ Storage

285. **Modelling Dispersion of CO₂ Plumes in Seawater as an Aid to Monitoring and Understanding Ecological Impact**
Jerry Blackford, Ricardo Torres, Plymouth Marine Laboratory
286. **Systems Analysis of Field and Laboratory Experiments Considering Impacts of CO₂ Leakage in Terrestrial Systems**
Alexander Bond, Richard Metcalfe, Philip Maul, Paul Suckling, Kate Thatcher, Russell Wlake, Quintessa Ltd, Karon Smith, Mike Steven, University of Nottingham; Daniel Rasse, Norwegian Institute for Agricultural and Environmental Sciences; Dave Jones, British Geological Survey
287. **Simulation of the Near Field Physiochemical Impact of a CO₂ Leakage Field Experiment in Loch Linnhe – Scotland**
Marius Dewar, Wei Wei, Jinhai Yang, Baixin Chen, Bahman Tohidi, Heriot-Watt University

288. **Effects of Elevated CO₂ on the Nitrification Activity of Microorganisms in Marine Sediment**
Masatoshi Hayashi, Yuji Watanabe, Akifumi Shimamoto, KANSO Technos; Jun Kita, RITE

289. **A Numerical Study on CO₂ Seepage from Offshore Geologic Storage Site**
Cheul Huh, Jung-Yeul Jung, Meang-Ik Cho, Seong-Gil Kang, Korea Ocean Research and Development Institute

290. **Assessing Model Uncertainties Through Proper Experimental Design**
Hilde Kristine Hvidevold, Guttorm Alendal, Truls Jahannessen, Trond Mannseth, University of Bergen

291. **Effects of Impurities in CO₂ Stream on Marine Organisms**
Jun Kita, RITE; Hideaki Kinoshita, MERI

292. **Werkendam, The Dutch Natural Analogue for CO₂ Storage – Long-Term Mineral Reactions**
Marielle Koenen, Laura J. Wasch, Marit E. van Zalinge, Susanne Nelskamp, TNO

293. **Estimation of Mass Transfer Coefficient of Contaminant Migration Across CO₂ - Brine Interface in CO₂ Geological Sequestration**
Yong Yang, Yongzhong Liu, Xiaoli Zhang, Xi'an Jiaotong University

294. **Monitoring the Safety of CO₂ Sequestration in Jingbian Field, China**
Jinfeng Ma, Xiaoli Zhang, Yimmao Wei, Zhenliang Wang, Junjie Ma, Shaojing Jiang, Lin Li, Northwest University; Xiangzeng Wang, Ruimin Gao, Chunxia Huang, Shaanxi Yanchang Petroleum Co. Ltd.

295. **Simulated CO₂ Leakage Experiment in Terrestrial Environment: Monitoring and Detecting the Effect on a Cover Crop Using 13C Analysis**
Christophe Moni, Daniel Rasse, Bioforsk

296. **Simulations of Upward Leakage of CO₂ in Long-Column Flow Experiments: The Impact of Boundary Conditions and Three-Phase Relative Permeability**
Curtis Oldenburg, Cristine Doughty, Patrick Dobson, Lawrence Berkeley National Laboratory; Catherine Peters, Princeton University

297. **Hypothetical Impact Scenarios for CO₂ Leakage from Storage Sites**
Alan Paulley, Richard Metcalfe, Michael Egan, Philip Maul, Quintessa Ltd; Laura Limer, Limer Scientific Consulting Ltd; Alv-Arne Grimstad, SINTEF Petroleum Research

298. **Numerical Prediction of the Diffusion of CO₂ Seeping from Seabed in Ardmuchnish Bay**
Chaki Mori, Toru Sato, Yuki Kano, University of Tokyo; Dmitry Aleynik, Scottish Association for Marine Science

299. **Mixing Gas Migration in Fractured Rock Through Unsaturated and Water-Saturated Layer: Result of a Pneumatic Gas Injection Test**
Very Susanto, Kyuro sasaki, Yuichi Sudai, Teruhisa Yamashiro, Kyushu University

300. **An Experimental Study of the Effects of Potential CO₂ Seepage in Sediments**
Yang Wei, CICC and NCCCS and University of Nottingham; Giorgio Caramann, Mercedes Maroto-Valer, CICC and NCCCS; Paul Nathaniel, Michael Steven, University of Nottingham

Experiences

301. **Assessing Field Pressure and Plume Migration in CO₂ Storages: Application of Case-Specific Workflows at In Salah and Sleipner**
Jean-Pierre, Deflandre, Audrey Estublier, Axelle Baroni, Alexander Fornel, Vincent Clochard, Nicolas Delepine, IFP Energies Nouvelles

302. **Effect of Reservoir Heterogeneity of Haizume Formation, Nagaoka Pilot Site, based on High-Resolution Sedimentological Analysis**
Shun Chiyonobu, Takahiro Nakajima, Yi Zhang, Zique Xue: RITE; Takeshi Tsuji, Kyoto University

303. **Sensitivity Study of the Reactive Transport Model for CO₂ Injection into the Utsira Saline Aquifer Using 3D Fluid Flow Model History Matched with 4D Seismic Data**
Audrey Estublier, Alexander Fornel, Teddy Parra, Jean-Pierre Defalndre, IFP Energies Nouvelles

304. **The Site Monitoring of the Lacq Industrial CCS Demonstration Project (France). Lessons Learned after Two Years and a Half of CO₂ Injection**
Marc Lescanne, Catherine Prinnet, Daniel Avila, Jean-Claude Miqueu, Jacques Monne, TOTAL

305. **Multi-Phase Equilibrium in a CO₂-Filled Observation Well at the Ketzin Pilot Site**
Matteo Loizzo, Actys BEE; Jan Hennings, Martin Zimmer, Axel Liebscher, GFZ German Research Center for Geosciences

306. **Overview, Status and Future of the Fort Nelson CCS Project**
James Sorensen, Charles Gorecki, Lisa Botnen, Edward Steadman, John Harju, EERC

307. Role of Impurities on CO₂ Injection: Experimental and Numerical Simulation of Thermodynamic Properties of Water-Salt-Gas Mixtures (CO₂ + Co-Injected Gases) Under Geological Storage Conditions

Jerome Sterpenich, Jean-Noel Jaubert, Eric Favre, Université de Lorraine; Mohamed Azarouel, BRGM; Veronique Lachet, IFPEN; Christophe Coquelet, Vincent Lagneau, ARMINES; Pierre Chiquet, Total

308. Lessons in the Development of Storage Projects from the Global CCS Institute Project Support Program

Steve Whittaker, Kathy Hill, Angeline Kneppers, Global CCS Institute

Modelling Tools & Approaches

309. Development of TOUGH-FrontISTR, a Numerical Simulator for Environmental Impact Assessment of CO₂ Geological Storage

Ryosuke Aoyagi, Ryuta Imai, Hiroyuki Kobayashi, Osamu Kitamura, Nobuhisa Goto, Mizuho Information and Research Institute, Inc; Jonny Rutqvist, Lawrence Berkeley National Laboratory

310. New Developments from the Coupled Simulator ECLIPSE–OpenGeoSys for Simulation of CO₂ Storage – Geomechanical Feedback on the Fluid Flow

Katharina Benisch, Sebastian Bauer, University of Kiel; Bastian Graupner, Swiss Federal Nuclear Safety Inspectorate ENSI

311. Prediction of Plume Migration Using Injection Data and a Model Selection Approach

Sayantan Bhowmik, Sanjay Srinivasan, Steven Bryant, University of Texas at Austin

312. A High Resolution Approach to Simulating Regional Migration and Well Risk at the IEAGHG Weyburn-Midale CO₂ Storage Project

Andrew Cavanagh, Landmark-Halliburton; Benjamin Rostron, University of Alberta

313. Impact of Co-Injected Gases on CO₂ Storage Sites: Geochemical Modeling of Experimental Results

Jerome Corvisier, Anne-Flore Bovalot, Vincent Lagneau, MINES ParisTech, Geosciences Center; Pierre Chiquet, TOTAL, CSTJF; Stephane Renard, Université de Lorraine, G2R Laboratory and IFP Energies Nouvelles; Jerome Sterpenich, Jacques Pironon, Université de Lorraine, G2R Laboratory

314. A Methodology to Assess Increased Storage Capacity Provided by Fracture Networks at CO₂ Storage Sites: Application to In Salah Storage Site

James Smith, Sevkett Durucan, Anna Korre, Ji-Quan Shi, Imperial College London

315. A Coupled Reservoir Simulation-Geomechanical Modelling Study of the CO₂ Injection-Induced Ground Surface Uplift Observed at Krechba, In Salah

Ji-Quan Shi, James Smith, Sevkett Durucan, Anna Korre, Imperial College London

316. Effect of CO₂ Injection Temperature on Caprock Stability

Gennady Gor, Jean-Herve Prevost, Princeton University

317. The Role of Static and Dynamic Modelling in the Fort Nelson CCS Project

Charles Gorecki, Terry Bailey, Guoxiang Liu, James Sorensen, Edward Steadman, EERC

318. Stochastic Predictions on CO₂ Leakage Potentials Based on Geostatistical Simulations in Heterogeneous Fields

Weon Shik Han, Ozlem Acar, Eungyu Park, Kyungpook National University; Kue-Young Kim, Korea Institute of Geoscience and Mineral Resources

319. On Uncertainties in Modeling CO₂-Brine-Caprock Interactions

Dag Wessel-Berg, University of Oslo

320. Dynamic Models of CO₂ Injection in the Surat and Bowen Basins, Queensland, Australia

Suzanne Hurter, Peter Probst, Yusuf Pamucku, Sebastian Gonzalez, Schlumberger Carbon Services; Andrew Garnett, Formerly CEO & Project Director ZeroGen, Australia

321. Accelerating of the Reservoir Simulator TOUGH2 by GPU

Yusuke Ishizawa, Keita Matsumoto, Progress Technologies, Inc; Kozo Sato, The University of Tokyo; Komei Okatsu, Yuji Miyake, Japan Oil, Gas and Metals National Corporation

322. Uncertainty Quantification of CO₂ Plume Migration Using Static Connectivity of Geologic Features

Hooyoung Jeong, Sanjay Srinivasan, Steven Bryant, The University of Texas at Austin

323. Development of a SAFT Equation of State for the H₂S-CO₂-H₂O-NaCl System for CO₂ Geological Storage with Co-Injection of H₂S

Xiaoyan Ji, Lulea University of Technology; Chen Zhu, Indiana University and University of Oslo

324. **Investigation of Potential Far Field Impacts on Freshwater Resources Related to CO₂ Storage: a Case Study of the HARP Project Site in Alberta, Canada**
Jon Jones, Alberta Innovates - Technology Futures and University of Waterloo; James Brydie, Ernie Perkins, Alberta Innovates - Technology Futures
325. **Effects of Heterogeneous Seal Layer Property on The Long-Term Behaviour of CO₂ Injected into Deep Saline Aquifers**
Yuki Kano, Tsuneo Ishido, Geological Survey of Japan/AIST
326. **CO₂-Brine-Mineral Interfacial Reactions Coupled with Fluid Phase Flow**
Dedong Li, Christof Beyer, Sebastian Bauer, University of Kiel
327. **Modeling of Carbon Dioxide Plume Migration for Saline Aquifer in Northern Taiwan**
Neng Chuan Tien, Chi Wen Liao, Lun Tao Tong, Industrial Technology Research Institute
328. **Investigating Stress Path Hysteresis in a CO₂ Injection Scenario using Coupled Geomechanical-Fluid Flow Modelling**
Tom Lynch, Doug Angus, Quentin Fisher, Piroska Lorinczi, University of Leeds
329. **Simulating CO₂ Injection and Storage with Limited Site Data: Utility of a Variably Complex Modeling Approach**
Walt McNab, Jeff Wagoner, Lawrence Livermore National Laboratory; John Rupp, Kevin Ellet, Indiana Geological Survey
330. **Development of a Basin-Scale Model for CO₂ Sequestration in the Basal Sandstone Reservoir of the Illinois Basin— Issues, Approach and Preliminary Results**
Edward Menhert, James Damico, Scott Frailey, Hannes Leetaru, Roland Okwen, Illinois State Geological Survey; Yu-Feng Lin, Illinois State Water Survey; Nathaniel Adams, Brynne Storsved, Albert Valocchi, University of Illinois
331. **Whole-System Process Modelling of CO₂ Storage and its Application to The In Salah CO₂ Storage Site, Algeria**
Richard Metcalfe, Alex Bond, Philip Maul, Alan Paulley, Quintessa Limited
332. **Assessing the Geomechanical Responses of Storage System in Geological CO₂ Storage: An Introduction of Research Program in the National Institute for Advanced industrial Science and technology (AIST)**
Yasuko Okuyama, Takahiro Funatsu, Xinglin Lei, Takashi Fuji, Shinsuke Nakao, Institute for Geo-Resources and Environment, GSJ, AIST; Shinichi Uehara, Toho University
333. **Large-Scale Impact of CO₂ Storage Operations: Dealing with Computationally Intensive Simulations for Global Sensitivity Analysis**
Jeremy Rohmer, Benoit Issautier, Christophe Chiaberge, Pascal Audigane, BRGM
334. **A Simulation Study of Simultaneous Acid Gas EOR and CO₂ Storage at Apache's Zama F Pool**
Dayanand Saini, Charles Gorecki, Damion Knudsen, James Sorensen, Edward Steadman, EERC
335. **Systematic Benchmark Development for Geological CO₂ Storage**
Ashok Singh, Joshua Taron, Wenqiong Wang, Uwe-Jens Görake, Helmholtz Centre for Environmental Research - UFZ; Norbert Böttcher, University of Technology Dresden; Olaf Kolditz, Helmholtz Centre for Environmental Research - UFZ; University of Technology Dresden
336. **Optimizing CO₂ Storage in a Deep Saline Aquifer with the Capacitance-Resistive Model**
Qing Tao, Steven Bryant, The University of Texas at Austin
337. **Modeling of Temperature Effects in CO₂ Injection Wells**
Arron Alie Tchouka Singhe, Guenter Pusch, Leonhard Ganzer, Clausthal University of Technology; Jann Rune Ursin, University of Stavanger; Jan Henniges, German Research Center for Geosciences
338. **Best Practices for Reservoir Modeling of Geologic CO₂ Storage**
Gary Teletzke, Pengbo Lu, ExxonMobil Upstream Research
339. **Mechanistic Modelling of CO₂ Storage in Weyburn CO₂-EOR Field - Numerical History Match and Prediction**
Mafiz Uddin, Alireza Jafari, Ernie Perkins, Alberta Innovates - Technology Futures

340. **Influence of Capillary Pressure and CO₂ Injection Rate as well as Heterogeneous and Anisotropic Permeability on Transport and Geologic Storage Efficiency of CO₂ in Saline Aquifer**
Dayong Wang, Mingloing Zhao, Yongchen Song, School of Energy and Power Engineering
341. **Numerical Studies on Field Scale Aquifer Storage of CO₂ Containing N₂**
Ning Wei, Xiaochun Li, Yan Wang, Ying Wang, Weizhong Kong, Chinese Academy of Sciences
342. **Fully Coupled Well Models for Fluid Injection and Production**
Mark White, Diana Bacon, Signe White, Fred Zhang, Pacific Northwest National Laboratory
343. **Implementations of a Flexible Framework for Managing Geologic Sequestration Modeling Projects**
Singe White, Luke Gosink, Chadrika Sivaramakrishnan, Gary Black, Sumit Purohit, Diana Bacon, Guang Lin, Ian Gorton, Alain Bonneville, Pacific Northwest National Laboratory
344. **High-Performance Supercomputing as a Risk Evaluation Tool for Geological Carbon Dioxide Storage**
Hajime Yamamoto, Shinichi Nanai, Taisei Corporation; Keni Zhang, Beijing Normal University; Pascal Audigane, Christophe Chiaberge, BRGM; Ryusei Ogata, NEC Corporation; Noriaki Nishikawa, Yuichi Hirokawa, Satoru Shingo, Japan Agency for Marine-Earth Science and Technology; Kengo Nakjima, The University of Tokyo
345. **Study on Geomechanical Stability of the Aquifer-Caprock System During CO₂ Sequestration by Coupled Hydromechanical Modelling**
Shuichi Yamamoto, Satoru Miyoshi, Kenichiro Suzuki, Obayashi Corporation
- Monitoring Technologies and Techniques**
346. **Methodology for Evaluating Technical Risks and Monitoring Methods Selection for CO₂ Geological Storage in Oltenia Region**
Sorin Anghel, Constantin Sava, Alexandra Dudu, GeoEcoMar - National Institute of Marine Geology and Geoecology
347. **Experiences with a Permanently Installed Seismic Monitoring Array at the CO₂ Storage Site at Ketzin (Germany)**
Rob Arts, Mei Zhang Arie Verdel, Sjef Meekes, Vincent Vandeweyer, TNO; Dario Santonico; R.P. Noorlandt, Delft Technical University and Deltares; B.F. Paap, TNO and Deltares
348. **Multifunctional Sensor for Monitoring of CO₂ Underground Storage by Comprehensive and Spatially Resolved Measuring of Gas Concentrations, Temperature and Structural Changes**
Matthias Bartholmai, Patrick Neumann, BAM Federal Institute for Materials Research and Testing
349. **The Laboratory Simulation and Field Verification of Seasonal Soil-Respired CO₂ Flux at a Proposed CCS Project Site**
James Brydie, Robert Faught, Mark Olson, Andrew Underwood, Bonnie Drozdowski, Alberta Innovates - Technology Futures
350. **Applicability of Long-Range Seismic Noise Correlation for CO₂ Geological Storage Monitoring**
Mickael, Delatre, Jean-Charles Manceau, BRGM
351. **Application of an Unsupervised Methodology for the Indirect Detection of CO₂ Leakages Around the Laacher See Lake in Germany Using Remote Sensing Data**
Rajesh Givinda, Anna Korre, Sevet Durucan, Imperial College London
352. **Monitoring Underground Migration of Sequestered CO₂ using Self-Potential Methods**
Tsuneo Ishido, Toshiyuki Tosha, Yuji Nishi, Geological Survey of Japan, AIST; John Pritchett, Science Applications International Corporation; Shigetaka Naknishi, J-Power
353. **Real Time Imaging of CO₂ Storage Zone by Very Accurate-Stable-Long-Term Seismic Source**
Junzo Kasahara, Ryoya Ituka, Naoyuki Fujii, Shizoka University; Shinji Ito, Tomohiro Fujiwara, NTT-data-CCS Co. Ltd; Yoko Hasada, Daiwa Exploration and Consulting Co. Ltd; Kayoko Tsuruga, Tokyo University; Koshunm Yamaoka, Nagoya University; Kiyoshi Ito, Kinya Nishigami, DPRE, Kyoto University
354. **Experimental and Numerical Study of Residual CO₂ Trapping in Porous Sandstone**
Keigo Kitamura, RITE and Kyushu University; Tetsuya Kogure, Osamu Nishizawa, Ziqiu Xue, RITE
355. **The Synergistic Pursuit of Advances in MMV Technologies for CO₂-Enhanced Recovery and CO₂ Storage**
Vello Kuuskraa, Tyler Van Leeuwen, Advanced Resources International, Inc.; Phil Dipietro, John Litynski, U.S. DOE/NETL

356. **Experimental Laboratory Study on the Acoustic Response of Sandstones During Injection of Supercritical CO₂ on CRC2 sample from Otway Basin Australia**
Maxim Lebedev, Vassili Mikhaltsevitch, CO2CRC/ Curtin University; Olga Bilenko, Curtin University; Tess Dance, CO2CRC/CSIRO; Marina Pervukhina, CSIRO; Boris Gurevich, CO2CRC/Curtin University/ CSIRO
357. **U.S. Department of Energy Efforts to Advance Remote Sensing Technologies for Monitoring Geologic Storage Operations**
John Litynski, U.S. DOE NETL; Ram Srivastava, Derek Vikara, Malcolm Webster, Keylogic, Inc
358. **Application of Improved Injection Well Temperature Model to Cranfield Measurements**
Zhiyuan Luo, Steven Bryant, The University of Texas at Austin; Tip Meckel, Bureau of Economic Geology, The University of Texas at Austin
359. **Feasibility Study for Using 2D Surface Seismic Surveys as a Monitoring Tool for Large Scale CO₂ Storage in the Gippsland Basin, Victoria, Australia**
Norzita Mat Fiah, L. Pekot, F. Poupeau, Aline Gendrin, Schlumberger Carbon Services; Andrew Garnett, Carbon Geostore Management Pty Ltd
360. **Development of a Permanent OBC System for CCS Monitoring in Shallow Marine Environments**
Akihisa Takashi, Naoshi Aoki, JGI, Inc.; Ziqiu Xue, RITE
361. **Monitoring of CCS Areas Using MUAUVs**
Patrick Neumann, M. Bartholmai, BAM Federal Institute for Materials Research and Testing; Sahar Asadi, Victor Hernandez Bennetts, Achim J. Lilienthal, Center for Applied Autonomous Sensor Systems
362. **CSEM Sensitivity Study for Sleipner CO₂-Injection Reservoir Monitoring**
Joonsang Park, Manzar Fawad, Inge Viken, Eyvind Aker, Tore Ingvald Bjørnarå, Norwegian Geotechnical Institute
363. **A Sensitivity Study of Pressure Monitoring to Detect Fluid Leakage from Geological CO₂ Storage Site**
Yong-Chan Park, Dae-Gee Huh, Chan-Hee Park, Korea Institute of Geoscience & Mineral Resources
364. **Metagenomics in CO₂ Monitoring**
Anne Gunn Rike, NGI; Othilde Elise Håvelsrud, NGI and University of Oslo; Thomas H.A. Haverkamp, Kjetill S Jacobsen, CEES and University of Oslo; Tom Kristensen, MERG and University of Oslo
365. **Applications of Non-Linear Elastic Wavefield Inversion for 4D Seismic Data to Characterize the Injected Carbon Dioxide**
Akio Sakai, Japan Petroleum Exploration Co.,Ltd.
366. **An Integrative Hierarchic Monitoring Approach for Detecting and Characterizing CO2 Releases**
Uta Sauer, Claudia Schütze, Peter Dietrich, Helmholtz Centre for Environmental Research (UFZ); Carsten Leven, University of Tübingen; Stefan Schlömer
367. **CO₂ Rock Physics: Laboratory Measurements of the Seismic Properties of Weyburn Project Carbonate Rocks**
Douglas Schmitt, Gauier Njiekak, Helen Yam, Randy Kofman, Mizan Chowdhury, University of Alberta
368. **Ground-Based Remote Sensing with Open-Path Fourier Transform Infrared (OP-FTIR) Spectrometry for Large-Scale Monitoring of Greenhouse Gases**
Claudia Schütze, Steffen Lau, Nils Reiche, Uta Sauer, Helkp Borsdorf, Peter Dietrich, Helmholtz Centre for Environmental Research (UFZ)
369. **Continuous Gravity Monitoring for CO₂ Geo-Sequestration**
Mituhiko Sugihara, Kazunari Nawa, Yuji Nishi, Tsuneo Ishido, Nobukazu Soma, AIST/GSJ
370. **Reservoir Fluid Monitoring in Carbon Dioxide Sequestration at Cranfield**
Sandeep Verma, Charles Oakes, T.S. Ramakrishnan, Schlumberger Doll Research, Seyyed Hosseini, Sue Hovorka, GCCC, BEG, University of Texas
371. **Geochemical Study on CO₂-Rich Waters of Daepyeong Area, Korea: Monitoring Implication for CO₂ Geologic Storage**
Byoung-Woo Yum, Gi-Tak, Chae, Minki Jo, Jeong-Chan Kim, KIGAM
372. **Correlation Analysis for Online CO₂ Leakage Monitoring in Geological Sequestration**
Zaoxiao Zhang, Denglong Ma, Jianqiang Deng, Xi'an Jiaotong University

Remediation and Contingency Planning

373. **From Geochemical Baseline Studies to Characterization and Remediation of Gas Leaks: Experiences and Case Studies of the French Institute for Risk Management (INERIS)**
Stéphane Lafortune, Zbigniew Pokryszka, Gaëtan Bentivenga, Régis Farret, INERIS

Reservoir Engineering

374. **Mass Transfer Coefficient for Carbon Dioxide Dissolution into Brine**
Christopher Blyton, Steven Bryant, The University of Texas at Austin
375. **Influence of Heterogeneities and Upscaling on CO₂ Storage Prediction at Large Scale in Deep Saline Aquifer**
Sarah Bouquet, Dominique Bruel, Chantal De Fouquet, Mines ParisTech
376. **Does Injected CO₂ Affect Reservoir System Integrity? A Comprehensive Experimental Approach**
Sebastian Fischer, Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences and Berlin Institute of Technology; Axel Liebscher, Kornelia Zemke, Marco De Lucia, Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences
377. **Core Analyses as Tools for Modeling Saline Aquifers**
Hiroshi Kameya, Hiroyuki Azuma, Shinichi Hiramatsu, Oyo Corporation; Chi-Wen Yu, Sinotech Engineering Consultants, Inc.; Chung-Hui Chiao, Taiwan Power Company / National Taiwan University; Ming-Wei Yang, Taiwan Power Company
378. **Effect of Sub-Core Scale Heterogeneity on Relative Permeability Curves of Porous Sandstone in Water-Supercritical CO₂ System**
Tetsuya Kogure, Osamu Nishizawa, Shun Chiyonobu, Yukihiro Yazaki, Seiji Shibatani, Ziqiu Xue, RITE
379. **Ground Heaving and Leakage Analysis for Sequestration of CO₂ in Geological Media Considering Fractures in Caprock**
Jaewon Lee, Ki-Bok, Seoul National University; Jonny Rutqvist, Lawrence Berkeley National Laboratory
380. **Feasibility of the Combination of CO₂ Storage and Saline Water Development in Sedimentary Basins of China**
Qi Li, Guizhen Liu, Bing Bai, Xiaochun Li, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences; Xuehao Liu, Miao Jing, The Graduate University of Chinese Academy of Sciences
381. **Offshore CCS in the Northern Gulf of Mexico and the Significance of Regional Structural Compartmentalization**
Timothy Meckel, Ramon Trevino, David Carr, Andrew Nicholson, Kersten Wallace, Gulf Coast Carbon Center, Texas Bureau of Economic Geology
382. **Evaluation of CO₂ Storage Potential, Injectivity and Uncertainty by the Numerical Analysis on Feasibility Study Sites**
Seiichi Ikeda, Masao Ohoka, Satoshi Tomimori, Shouchi Hishida, Mariko Seguchi, Jyunya Takeshima, Hiroyuki Azuma, OYO Corporation; Masato Takagi, Kazuo Koide, Jyunich Shimizu, RITE
383. **Dehydration of Gypsum under Dry CO₂ Injection**
Jacques Pironon, Jean Dubessy, Jérôme Sterpenich, Pascal Robert, Khadija Andjar, Aurélien Randi, CNRS-Université de Lorraine; Marc Parmentier, Arnaud Lassin, BRGM; Stéphane Renard, CNRS-Université de Lorraine and IFPEN
384. **Global Optimization of Injection Well Placement Toward Higher Safety of CO₂ Geological Storage**
Takashi Goda, Kozo Sato, The University of Tokyo
385. **Improvement of CO₂ Geological Storage Efficiency by Injection and Production Well Design**
Key Tanaka, Javier Vilcáez, Kozo Sato, The University of Tokyo
386. **CO₂ Injection in a Saline Formation: Pre-Injection Reservoir Modeling and Uncertainty Study for Illinois Basin-Decatur Project**
Ozgur Senel, Schlumberger Carbon Services; Nikita Chugunov, Schlumberger-Doll Research
387. **Effective Storage Capacity Study in a Deep Saline Aquifer within a Young Sedimentary Basin**
Chung-Hui Chiao, National Taiwan University and Taiwan Power Company; Kuo Shih Shao, Yi-Rui Lee, Chi-Wen Yu, Sinotech Engineering Consultants, Inc.; Lian-Tong Hwang, Taiwan Power Company; Chai-Yu Lu, National Taiwan University
388. **Optimization of Injection/Extraction Rates for Surface Dissolution Process**
Qing Tao, Steven Bryant, The University of Texas at Austin
389. **Development of Carbon Dioxide Microbubble Sequestration into Saline Aquifer and CO₂-EOR Reservoirs**
Ziqiu Xue, RITE; Shinya Tsuji, Toshifumi Matsuoka, Kyoto University; Hiromichi Kameyama, Susumu Nishio, Technology Research Institute, Tokyo Gas Co., Ltd

390. **Simulation Study of CO₂ Micro-Bubble Generation through Porous Media**
Hirotatsu Yamabe, Toshifumi Matsuoka, Kyoto University; Kenichi Nakaoka, INPEX Cooperation; Ziqiu Xue, RITE; Hiromichi Kameyama, Susumu Nishio, Tokyo Gas Co., Ltd

Risk Assessment and Management

391. **ULTimateCO₂ : A FP7 European Project Dedicated to the Understanding of the Long Term Fate of Geologically Stored CO₂**
Pascal Audigane, BRGM; Steven Brown, CO2SENSE; Alain Dimier, EIFER; Peter Frykman, GEUS; Fabrizio Gherardi, IGG-CNR; Yan Le Gallo, GEOGreen; Nicolas Maurand, IFPEN; Anne Marie Muntendam, TNO; Heie Rütters, BGR; Jonathan Pearce, BGS Chris Spiers, University of Utrecht; Thierry Yalams, PHI-MECA Engineering

392. **Particle Image Velocimetry for Quantification of High Pressure CO₂ Release**
Arjen de Jong, Mark Spruijt, TNO

393. **Small Scale Jet-Release Studies of High Pressure and Supercritical CO₂ for Release and Dispersion Model Validation**
Corina Hulsbosch, Mark Spruijt, Arjen de Jong, Jacco Moorhoff, Henny Veerman, John Zevenbergen, TNO

394. **An Experimental Investigation of Liquid CO₂ Release through a Capillary Tube**
Jooil Kim, Daejun Chang, Sang Heon Han, KAIST

395. **A Tool for Integrating and Communicating Performance-Relevant Information in CO₂ Storage Projects: Description and Application to In Salah**
Richard Metcalfe, Alan Paulley, Paul Suckling, Claire Watson, Quintessa Limited

396. **Risk Assessment and Management Associated with CCS using Fault Tree Analysis**
Behdeen Oraee-Mirzamani, Tim Cockerill, Zen Makuch, Imperial College London

397. **Numerical Study on Flow Behaviour of CO₂ Around Injected Well for Risk Assessment of Carbon Capture and Storage**
Yasuhide Sakamoto, Atsuko Tanaka, Norio Tenma Takeshi Komai, National Institute of Advanced Industrial Science (AIST)

398. **Technical Work Processes for Qualifying Geological CO₂ Storage**
Gøril Tjetland, Espen Erichsen, Ross Offshore; Hallvard Høydalsvik, Gassnova SF; Fredrik Gillebo, Deloitte

399. **Containment Risk Management for CO₂ Storage in the Goldeneye Depleted Gas Field, UK North Sea**
Owain Tucker, Martin Holley, Shell Projects and Technology

400. **Experimental Data from CO₂ Releases from a Saturated Liquid Reservoir using High Speed Camera and Laser Illumination**
Knut Vaagsaether, Sindre Toesse, Joachim Lundberg, Andre Gaathaug, Dag Bjerketvedt, Telemark University College; Sandra Nilsen, Statoil ASA

401. **Integrated Carbon Risk Assessment (ICARAS)**
Ton Wildenborg, Jens Wollenweber, Danijela Sijacic, Manuel Nepveu, Ingrid Raben, TNO; Daniel Busby, Dan Bossie Codreanu, IFP Energies Nouvelles; Dag Wessel-Berg, Alve Arne Grimstad, Ane Lothe, SINTEF, Norway

402. **Features Events and Processes (FEPs) and Scenario Analysis in the Field of CO₂ Storage**
Kohei Yamaguchi, Koichi Takizawa, Hironobu Komaki, Ziqiu Xue, RITE; Richard Metcalfe, Quintessa Limited; Masaaki Yamaguchi, Quintessa Japan; Hiroyasu Kato, Shinzo Ueta, Mitsubishi Materials Corporation

403. **Comparison of CO₂ and Natural Gas Recovery from a Storage Site**
Yueng Yip, Antonio Baclig, Ernst van Niero, Mark Henle, Shipeng Fu, C12 Energy

Site Characterisation and Selection

404. **Evaluating Seal Quality for Potential Storage Site in the North Sea**
Matthiue Angeli, Roy Gabrielsen, Jan Inge Faleide, University of Oslo

405. **Integrated Approach to CO₂ Storage Assessment in the Offshore South Perth Basin, Australia**
Irina Borissova, John Kennard, Danielle Robertson, Megan Lech, Liuqi Wang, Chris Lewis, Chris Southby, Geoscience Australia

406. **New Certification Framework for CO₂ Storage Sites**
Mike Carpenter, Jørg Aarnes, Todd Flach, Elisabeth Rose, DNV

- 407. Monitoring Approaches for Detecting and Evaluating CO₂ and Formation Water Leakages into Near-Surface Aquifers**
Frank Dethlefsen, Ralf Kober, Dirk Schafer, Andreas Dahmke, Said Attia al Hagrey, Jochen Grossman, Matthias Beyer, University of Kiel
- 408. Development of Key Performance Indicators for CO₂ Storage Operability and Efficiency Assessment: Application to the Southern North Sea Rotliegend Group**
Anna Korre, Sevet Durucan, Ji-Qian Shi, Amer Syed, Rajesh Govindan, Imperial College London; Sarah Hannis, John Williams, Gary Kirby, Martyn Quinn, British Geological Survey
- 409. To a Dynamic Update of the Sleipner CO₂ Storage Geological Model**
Alexandre Fornel, Audrey Estublier, IFP Energies Nouvelles
- 410. Preliminary Containment Evaluation in the Surat and Bowen Basins, Queensland, Australia**
Sebastian Gonzalez, Suzanne Hurter, Schlumberger Carbon Services; Andrew Garnett, Formerly CEO & Project Director ZeroGen
- 411. Cross-International Boundary Effects of CO₂ Injection**
Sarah Hannis, Stephanie Bricker, Aaron Goater, Sam Holloway, Jeremy Rushton, Gareth Williams, British Geological Survey
- 412. Reservoir Evaluation for the Moebetsu Formation at Tomakomai Candidate Site for CCS Demonstration Project in Japan**
Daisuke Ito, Jun Mikami, Mitsuru Kamon, Koji Kawada, Mizue Nishimura, Satoru Tomita, Kohei Akaku, Tatsuhiko Matsuura, Japan Petroleum Exploration Co., Ltd; Takao Inamori, JGI, Inc.; Yoshinori Yamanouchi, Japan CCS Co., Ltd
- 413. Refinement Of The Weyburn-Midale Geological and Hydrogeological Model: Develop a Better Understanding of the Heterogeneity Present to Determine Reservoir Response to Injected CO₂ and Subsequent CO₂ Movement**
Gavin Jensen, Saskatchewan Geological Survey; Erik Nickel, Petroleum Technology Research Centre; Ben Rostron, University of Alberta
- 414. Seismic Reflection Survey to Allocate 3000m Deep Target Formation in a Preferred Carbon Sequestration Site**
Wen-Chung Ko, Chi-Wen Yu, Sinotech Engineering Consultants, Inc; Chung-Hui Chiao, Lian-Tong Hwang, Ming-Wei Yang, Taiwan Power Company
- 415. Planning a Pilot Injection Test for a 3000m Deep Saline Aquifer in a Preferred Carbon Sequestration Site**
Chi-Wen Yu, Wen-Chung Ko, Sinotech Engineering Consultants, Inc; Chung-Hui Chiao, Lian-Tong Hwang, Ming-Wei Yang, Taiwan Power Company
- 416. Pre-Competitive Data Acquisition Program for CO₂ Storage in Australia**
Robert Langford, Irina Borissova, Alfredo Chirinos, Paul Henson, Andrew Heap, Geoscience Australia
- 417. Reservoir Evaluation for the T1 Member of the Takinoue Formation at Tomakomai Candidate Site for CCS Demonstration Project in Japan**
Jun Mikami, Daisuke Ito, Mitsuru Kamon, Arata Katoh, Sinjiro Kuroki, Kohei Akaku, Tatsuhiko Matsuura, Japan Petroleum Exploration Co. Ltd; Takuya Maeda, Takao Inamori, JGI, Inc; Yoshinori Yamanouchi, Japan CCS Co. Ltd.
- 418. Progress Report of AIST's Research Programs for CO₂ Geological Storage**
Shinsuke Nakao, Toshiyuki Tosha, Geological Survey of Japan, AIST
- 419. Site Characterisation for CO₂ Storage: a Workflow Aligned with the EU Storage Directive**
Filip Neele, Manuel Nepveu, Cor Hoftsee, Jens Wolleneber; TNO; Florence Delprat-Jannaud, Olivier Vincke, IFPEN; Valentina Volpi, OGS; Ane Lothe, SINTEF; Suzanne Brunsting, ECN; Jonathan Pearce, BGS
- 420. Evaluation of CO₂ Storage Potential for Feasibility Study Sites on Innovative Zero-Emission Coal Gasification Power Generation**
Masao Ohoka, Tadashi Araya, Masaru Nakamura, Syoichi Nishiyama, Chisato Konishi, Mio Shimoyama, OYO Corporation; Kazuo Koide, Junich Shimizu, Chikara Iwamoto, RITE
- 421. Experimental Investigations in CO₂ Sequestration and Shale Caprock Integrity**
Abiola Olabode, Mileva Radonjic, Craft & Hawkins Louisiana State University
- 422. Challenges with Qualification of Storage Sites for CCS in Deep Aquifers Exemplified by the Mongstad Storage Site Study, Norway**
Kari-Lise Rørvik, Lise Horntvedt, Espen Erichsen, Trude Ravn, Per Ola Andfossen Hallvard Høydalsvik, Eirik Harding Hansen, Gassnova SF
- 423. Petrophysical Properties and Capacity of Prospective for CO₂ Geological Storage Baltic Offshore and Onshore Structures**
Kazbulat Shogenov, Alla Shogenova, Tallinn University of Technology; Vizika-Kavvadias Olga, IFP Energies Nouvelles

424. Core Scale and Pore Scale Characterization of Liujiagou Sandstone, Ordos Basin, China for CO₂ Aquifer Storage

Yan Wang, Ning We, Ying Wang, Xiaochun Li, Chinese Academy of Sciences; Kathy Bruner, Dustin Crandall, URS Corporation; Igor Haljasmaa, Grant Bromhal, U. S. DOE, NETL

425. Portfolio Analysis of Carbon Sequestration Technologies and Barriers to Adoption: General Methodology and Application to Geological Storage

Jillian Young-Lorenz, David Lumley, University of Western Australia

Storage Capacities

426. CO₂ Storage Potential in the Nordic Region

Karen L. Anthonsen, Geological Survey of Denmark and Greenland; Per Aagaard, University of Oslo; Per E.S. Bergmo, SINTEF Petroleum Research; Mikael Erlström, Geological Survey of Sweden; Sigurdur R. Gidlason, University of Iceland; Ane Lothe, SINTEF Petroleum Research

427. CO₂ Geological Storage in the Province of Québec, Canada – Basin-Scale Prospectivity Assessment and Capacity Evaluation

Karine Bédard, Michel Malo, Félix-Antoine Comeau, Institut National de la Recherche Scientifique

428. The Occurrence of Faults in the Bunter Sandstone Formation of the UK Sector of the Southern North Sea and the Potential Impact on Storage Capacity

Michelle Bentham, BGS; Andrew Green, Dennis Gammer, ETI

429. Towards International Guidelines for CO₂ Storage Resource Estimation

Sean Brennan, Peter Warwick, USGS; Rick Causebrook, Geoscience Australia; Peter Gerling, BGR; Wolf Heidug, Juho Lipponen, Sean McCoy, IEA; Sam Holloway, BGS; Henk Pagnier, TNO; Don White, GSC

430. CO₂ Storage Capacity Assessment in the Deep Saline Aquifers of Southern Israel

Ran Calvo, Zohar Gvirtzman, Geological Survey of Israel

431. CO₂ Storage Capacity of Campos Basin's Oil Fields, Brazil

Gabriela Camboim Rockett, Joao Marcello Medina Ketzner, PUCRS / CEPAC; Ramirez Ramirez, Machteld van den Broek, Utrecht University / Copernicus Institute

432. CO₂ Sequestration Potential of Unmineable Coal; State of Knowledge

Margo Corum, Kevin Jones, Peter Warwick, U.S. Geological Survey

433. Uncertainty in Regional-Scale Evaluation of CO₂ Geologic Storage Resources-Comparison of the Illinois Basin (USA) and the Ordos Basin (China)

Kevin Ellet, Cristian Medina, John Rupp, Indiana Geological Survey, Indiana University; Guochang Wang, Timothy Carr, West Virginia University

434. Ranking of Indonesia Sedimentary Basins and Storage Capacity Estimates for CO₂ Geological Storage

Utomo Pratama Iskander, Usman, Sudaraman Sofyan, R&D Centre for Oil and Gas Technology 'LEMIGAS'

435. Modelling of CO₂ Injection in Fluvial Sedimentary Heterogeneous Reservoirs to Assess the Impact of Geological Heterogeneities on CO₂ Storage Capacity and Performance

Benoit Issautier, Pascal Audigane, BRGM; Simon Fillacier, Yann Le Gallo, Geogreen

436. Potential of Sub-Seafloor CO₂ Geological Storage in Northern South China Sea and its Importance for CCS Development in South China

Pengchun Li, Di Zhou, Zhongxiang Zhao, Cuimei Zhang, Yufan Zhang, Chinese Academy of Sciences

437. The Ordos Basin: a Premier Basin for Integrating Geological CO₂ Storage with Enhanced Oil Recovery Projects in China

Tingting Luo, Yajun Wang, Lifa Zhou, Shaanxi Provincial Institute of Energy Resources and Chemical Engineering; Ronald Surdam, Zhunsheng Jiao, University of Wyoming Carbon Management Institute

438. Storage Capacity Evaluation for Development of CO₂ Infrastructure in the West Mediterranean

Roberto Martínez, Isabel Suárez, IGME; Júlio Carneiro, Fátima Cardoso, University of Évora; Tiago Cunha, LNEG; Yassine Zarhoule, University Mohammed Premiere; Yves-Michel Le-Nindre, BRGM

439. **CO₂ Storage Resource Potential of the Cambro-Ordovician Saline System in the Western Interior of North America**
Wesley Peck, Damion Knudsen, Chad Crotty, Charles Gorecki, James Sorensen, EERC; Stefan Bachu, Tyler Hauck, Stephen Talman, Jesse Peterson, Anatoly Melink, Alberta Innovates – Technology Futures
440. **Long-Term Behaviour of CO₂ Stored in a Large Scale in the Utsira Formation, North Sea, Norwegian Continental Shelf**
Van Pham, Inge Tappel, Eva Hallandm Ine Gjeldvik, Tor Eidvin, Rita Rød, Christian Magnus, Wenche Johansen, Fridjof Riis, Norwegian Petroleum Directorate
441. **Sub-Sea-floor Carbon Dioxide Storage Potential on the Juan de Fuca Plate, Western North America**
Jerry Fairley, Center for Advanced Energy Studies and University of Idaho; Robert Podgorney, Center for Advanced Energy Studies and Idaho National Laboratory
442. **Characterizing Buoyant Plume Migration Through Domains with Fine-Scale Heterogeneity**
Priya Ravi Ganesh, Steven Bryant, Timothy Meckel, University of Texas at Austin
443. **The Impact of Mineralogy and Oil:Water Ratios on Estimates of CO₂ Storage at the IEA Weyburn-Midale CO₂ Monitoring and Storage Project**
Ian Hutcheon, Maurice Shevalier, Kyle Durocher, Bernhard Meyer, University of Calgary; John Bloch, Casa Gausalupita
444. **Numerical Investigation of the Storage Efficiency Factor for CO₂ Geological Sequestration in Saline Formations**
Yang Wang, Keni Zhang, Beijing Normal University
445. **U.S. Geological Survey Geologic Carbon Dioxide Storage Resource Assessment of the United States**
Peter D. Warwick, Madalyn S. Blondes, Sean T. Brennan, Margo D. Corum, Matthew Merrill, U.S. Geological Survey
446. **Quantification of Practical and Matched CO₂ Storage Capacity for Insufficiently Known Reservoirs**
Kris Welkenhuysen, Kris Piessens, Geological Survey of Belgium - Royal Belgian Institute of Natural Sciences
447. **The First North American Carbon Storage Atlas**
Frank Mourits, Natural Resources Canada; Leonardo Beltran, Secretariat of Energy, Mexico; Moises Davila, Federal Commission of Electricity, Mexico; Robert Wright, U.S. Department of Energy,
448. **Probabilistic Aggregation of Individual Assessment Units in the U.S. Geological Survey National CO₂ Sequestration Assessment**
Madalyn Blondes, Ricardo Olea, Lawrence Drew, Peter Warwick, U.S. Geological Survey, Energy Resources Science Center; John Schuenemeyer, Southwest Statistical Consulting
449. **Estimation of CO₂ Storage Capacity in Porous Media by using X-ray Micro-CT**
Yu Liu, Yongchen Song, Hongfei Zheng, Zijian Shen, Bo Su, Dalian University of Technology

Trapping Mechanisms

450. **CO₂ Leakage Prevention by Introducing Engineered Nanoparticles to the In-Situ Brine**
Behdad Aminzadeh, Doo Chung, David DiCarlo, Steven Bryant, Chun Huh, The University of Texas at Austin
451. **Potential Triassic and Jurassic CO₂ Storage Reservoirs in the Skagerrak-Kattegat Area**
Irfan Baig, Per Aagaard, Caroline Sassier, Jan Inge Faleide, Jens Jahren, Roy H. Gabrielsen, University of Oslo; Manzar Fawad, Norwegian Geotechnical Institute; Lars Henrik Nielsen, Lars Kristensen, Geological Survey of Denmark and Greenland; Per E.S. Bergmo, SINTEF Petroleum
452. **CO₂ Storage from Blast Furnace in the Triassic Sandstones of Lorraine, (Eastern Paris Basin, France): An Experimental Study**
Clément Belgodere, Université de Lorraine, CNRS, G2R Laboratory / CREGU; Jérôme Sterpenich, Jacques Pironon, Université de Lorraine, CNRS, G2R laboratory; Jean-Pierre Birat, ArcelorMittal
453. **Experimental and Numerical Studies of Density-Driven Natural Convection in Saturated Porous Media with Application to CO₂ Geological Storage**
Sylvie Chevalier, Tilty Farhana Faisel, Mohamed Sassi, Masdar Institute of Science and Technology
454. **2-D Reactive Transport Modeling of the Fate of CO₂ Injected into a Saline Aquifer in the Wabamum Lake Area (Alberta, Canada)**
Chantsalmaa Dalkhaa, Maurice Shevalier, Bernhard Mayer, Michael Nightingale, University of Calgary
455. **Wettability Behavior of CO₂ at Sequestration Conditions**
Raheleh Farokhpour, Ole Torsæter, Norwegian University of Science and Technology; Bård J.A. Bjørkvik; Erik Lindeberg, SINTEF Petroleum Research
456. **Trapping Effects of Small Scale Sedimentary Heterogeneities**
Peter Frykman, Carsten Nielsen, Niels Bech, GEUS

457. **Examination of Methods to Measure Capillary Threshold Pressures of Pelitic Rock Samples**
Kei Kawaura, Kohei Akaku, Masanori Nakano, Takashi Takahashi, Shinichi Kiriakehata, JAPEx Technical Division Research Center, Japan Petroleum Exploration Co. Ltd.; Daisuke Ito, Japan Petroleum Exploration Co., Ltd; Hitoshi Suzuki, Japan CCS Co, Ltd.
458. **Ex-Situ Dissolution of CO₂ for Carbon Sequestration**
Yuri Leonenko, University of Waterloo
459. **Clay Hydration / Dehydration in Dry to Water-Saturated Supercritical CO₂: Implications for Caprock Integrity**
John Loring, Todd Schaef, Chris Thompson, Quinn Miller, Jianzhi Hu, David Hoyt, Paul Martin, Eugene Ilton, Andrew Felmy, Kevin Rosso, Pacific Northwest National Laboratory
460. **Experimentally Measurements of Threshold Pressure for Modeling Saline Aquifers in Japan**
Masaki Ono, Hiroshi Kameya, Kohichi Hosoda, Yotsuo Kamidazono, Hiroyuki Azuma, Oyo Corporation
461. **Core Scale Modelling of CO₂ Flowing: Identifying Key Parameters and Experiment Fitting**
Desiree Petrilli, Pascal Audigane, BRGM; Ruina Xu, Luo Shu, Tsinghua University
462. **Precipitation Kinetics of Sulfate-Bearing Minerals Under Environmental Condition of CO₂ Geological Storage**
Peter (Pedro) Rendel, Jiwchar Ganor, Ben-Gurion University of the Negev; Domenik Wolff-Boenisch, University of Iceland; Ittai Gavrieli, Geological Survey of Israel
463. **Experimental and Numerical Studies of CO₂ Injection into Saturated Porous Media: Capillary to Viscous to Fracture Fingering Phenomenon**
Mohamed Sassi, Amima Islam, Sylvie Chevalier, Masdar Institute of Science and Technology
464. **Density Measurement of CO₂ + Deionized Water in Warm Formations by a Magnetic Suspension Balance**
Yong Shen, Yi Zhang, Yongchen Song, Weiwei Jian, Yangchun Zhan, Cheng Hu, Dalian University of Technology
465. **Containment Impact of Calcite Pathways in the Primary Caprock of CO₂ Storage in a Depleted North Sea Gas Field**
Jeroen Snippe, Shell Projects and Technology; Lingli Wei, Shell China Limited; Owain Tucker, Shell Projects and Technology
466. **Carbonate Reaction Experiments at Carbonated and Bicarbonated Springs as a Natural Analogue Field of CO₂ Geological Sequestration**
Masao Sorai, Munetake Sasaki, National Institute of Advanced Industrial Science and Technology
467. **Gas Injection in a Water Saturated Porous Medium: Effect of Capillarity, Buoyancy, and Viscosity Ratio**
Tetsuya Suekane, Katuhiro Okada, University of Tokushima
468. **Observation of Buoyant Plumes in Countercurrent Displacement: Influence of Local Capillary Trapping –a Bench Scale Experiment**
Yuhao Sun, Angelica Hernandez, Steven Bryant, The University of Texas at Austin
469. **Simulation Study of Density-Driven Natural Convection Mechanism in Isotropic and Anisotropic Brine Aquifers using a Black Oil Reservoir Simulator**
Amir Taheri, Ole Torsæter, NTNU; Dag Wessel-Berg, Sintef Petroleum Research
470. **Geochemical Effects of Storing CO₂ in the Basal Aquifer that Underlies the Prairie Region in Canada**
Stephan Talman, Ernie Perkins, Stephan Bachu, Alberta Innovates Technology Futures; Andrew Wigston, David Ryan, CanmetENERGY
471. **Mineral Migration and Regeneration Reactions in the Two Phase Flow Experiment**
Cheng-Hsien Tsai, Chih-Hau Yung, Sinotech Engineering Consultants, Inc; Yuh-Ruey Wang, National Taipei University of Technology, Chung-Hu Chiao, Taiwan Power Company
472. **How Rock Mechanical Properties Affect Fault Permeability in Neogene Mudstone?**
Shin-Ichi Uehara, Toho University; Miki Takahashi, Geological Survey of Japan, AIST

473. Mineralogical Alterations During Laboratory-Scale Carbon Sequestration Experiments for the Illinois Basin

Lois E. Yoksoulan, Jared T. Freiburg, Shane K. Butler, Peter M. Berger, William R. Roy, University of Illinois (Urbana-Champaign), Prairie Research Institute, Illinois State Geological Survey

474. Density Measurements and SAFT EOS of Supercritical CO₂-H₂O System for CO₂ Geological Storage

Yi Zhang, Yongchen Song, Yong Shen, Weiwei Jian, Yangchun Zhan, Wanli Xing, Cheng Hu, Dalian University of Technology

475. Containment of CO₂ in CCS: Role of Caprocks and Faults

John Kaldi, Ric Daniel, Ulrike Schacht, Guillaume Backe, CO2CRC@University of Adelaide; Eric Tenthorey, CO2CRC@Geoscience Australia; Karsten Michael, Jim Underschulz, CO2CRC@CSIRO; Andy Nicol, CO2CRC@GNS

Wellbore Integrity

476. Towards a Frequency Distribution of Effective Permeabilities of Leaky Wellbores

Dean Checkai, Qing Tao, Steven Bryant, University of Texas at Austin

477. Wellbore Permeability Estimates from Vertical Interference Testing of Existing Wells

Sarah Gasda, Uni CIPR; Michael Celia, James Wang, Princeton University; Andrew Duguid, Schlumberger Carbon Services

478. Analysis of Interfacial De-Bonding of Geopolymer Annular Sealing in CO₂ Geo-Sequestration Wellbore

Giasuddin Haider, Jay Sanjayan, Swinburne University of Technology; P.Ranjith, Monash University

479. Advanced Cement Integrity Evaluation of an Old Well in the Rouse Field

Matteo Loizzo, Actys BEE; Ulrike Miersemann, Schlumberger Carbon Services; Patrik Lamy, Andre Garnier, Total S.A.

480. Analysis on the Chemical and Mechanical Stability of the Grouting Cement for CO₂ Injection Well

Taehee Kim, Gi-Tak Chae, Hee-Kwon Lee, Seung-Woo Lee, Byung-Woo Yum, Korean Institute of Geoscience and Mineral Resources

481. ULtimateCO₂ Project: Field Experiment in an Underground Rock Laboratory to Study the Well Sealing Integrity in the Context of CO₂ Geological Storage

Jean-Charles Manceau, Pascal Audigane, Francis Claret, Marc Parmentier, BRGM; Tim J. Tambach, TNO; Fabrizio Gherardi, IGG; Alain Dimier, Olaf Ukelis, Elodie Jeandel, Francis Cladt, EIFER; Thierry Yalamas, PHIMECA; Christophe Nussbaum, SWISSTOPO

482. Thermodynamic Modeling of Carbonation of Cementitious Materials in Contact with Supercritical CO₂

Hiroaki Minoo, Tetsuya Ishida, Yuya Takahashi, University of TOKYO

483. Chemical Impacts of CO₂ Flooding on Well Composite Samples: Experimental Assessment of Well Integrity for CO₂ Sequestration

Yuki Asahara, Saeko Mito, Ziqiu Xue, RITE; Yuji Yamashita, Kazutoshi Miyashiro, Japan CCS Co, Ltd.

484. Assessment of Well Integrity at Nagaoka CO₂ Injection Site Using Ultrasonic Logging and Cement Bond Log Data

Takahiro Nakjima, Ziqiu Xue, RITE; Jiro Watanabe, Yoshihiro Ito, Susumu Sakashita, Geophysical Surveying Co, Ltd

485. Influence of Pressure, CO₂ and Chromium-Content of Injection Pipe Steels on the Reliability of a Saline Aquifer Water CCS-Site in the Northern German Basin

Anja Pfennig, Sabrina Sultz, HTW Applied University of Berlin; Axel Kranzmann, BAM Federal Institute of Materials Research and Testing Berlin

486. Corrosion Fatigue Behavior and S-N-curve of AISI 420 Exposed to CCS-Environment Obtained from Laboratory In-Situ-Experiments

Anja Pfennig, Reiner Weigand, Marcus Wolf, HTW Applied University of Berlin; Axel Kranzmann, Claus-Peter Bork, BAM Federal Institute of Materials Research and Testing Berlin

487. Reactive Flow Channelization in Fractured Cement- Implications for Wellbore Integrity

Quinn Wenning, Marc Hesse, Steven Bryant, The University of Texas at Austin; Nicolas Huerta, The University of Texas at Austin and US DOE NETL

488. The Long-Term Corrosion Behavior of Abandoned Wells at CO₂ Geological Storage Conditions: (1) Experimental Results for Cement Alteration

Hisao Satoh, Satoko Shimoda, Kohei Yamaguchi, Hiroyasu Kato, Mitsubishi Materials Corporation; Yuji Yamashita, Kazutoshi Miyashiro, Shigeru Saito, Japan CCS Co., Ltd

489. The Long-Term Corrosion Behavior of Abandoned Wells at CO₂ Geological Storage Conditions: (2) Experimental Results for Casing Steel Corrosion

Shigeki Azuma, Hiroyasu Kato, Mitsubishi Materials Corporation; Kazutoshi Miyashiro, Shigeru Saito, Japan CCS Co., Ltd

490. The Long-Term Corrosion Behavior of Abandoned Wells at CO₂ Geological Storage Conditions: (3) Assessment of Long-Term (1,000-Year) Performance of Abandoned Wells for Geological CO₂ Storage

Kohei Yamaguchi, Hiroyasu Kato, Satoko Shimoda, Mitsubishi Materials Corporation; Michael Stenhouse, Wei Zhou, Alexandro Papafotiou, INTERA Incorporated; Yuji Yamashita, Kazutoshi Miyashiro, Shigeru Saito, Japan CCS Co., Ltd.

491. Corrosion Studies on Casing Steel in CO₂ Storage Environments

Xiaolong Zhang, John Zevenbergen, Tjirk Benedictus, TNO

Other

492. IEAGHG Research Networks, Past Achievements and Future Focus

Toby Aiken, Ameena Camps, Samanatha Neades, Ludmilla Basava-Reddi, Tim Dixon, IEAGHG

Developments in Other Storage Options for CO₂

Basalts and other Low Permeability Reservoirs

493. Experimental Studies on In-Situ CO₂ Mineral Storage: Presentation of a Novel Plug Flow Reactor

Iwona Galeczka, Domenik Wolff-Boenish, Sigurdur Gilason, University of Iceland

Coal Beds

494. Safety Assessment of CO₂ Storage in Coal-Bearing Formation

Sohei Shimada, Yukiya Sakou, The University of Tokyo

Mineralisation

495. Impact of Alkalinity Sources on the Life-Cycle Energy Efficiency of Mineral Carbonation Technologies

Abigail Kirchofer, Jeniifer Wilcox, Adam Brandt, Stanford University; Sam Krevor, Imperial College; Valentina Prigiobbe, University of Texas at Austin

496. Experimental Studies on Mineral Sequestration of CO₂ with Buffer Solution and Fly Ash in Brines

Qi Liu, Mercedes Maroto-Valer, University of Nottingham

497. Density Functional Theory Calculations of the Interaction of Olivine with Water

Valentina Prigiobbe, University of Texas at Austin; Dong-Hee Lim, Ana Suarez-Negreira, Jennifer Wilcox, Stanford University

498. Silicate Carbonation in Supercritical CO₂ Containing Dissolved H₂O: an In-Situ High Pressure X-Ray Diffraction Study

HT Schaef, QRS Miller, CJ Thompson, JS Loring, ME Bowden, BW Arey, BP McGrail, KM Rosso, Pacific Northwest National Laboratory

499. Tracing Carbon: Natural Mineral Carbonation and the Incorporation of Atmospheric vs. Recycled CO₂

Amy Stephen, Gawen Jenkin, Daniel Smith, University of Leicester; Mike Styles, Jon Naden, BGS; Adrian Boyce, Scottish Universities Environmental Research Centre; Melanie Leng, University of Leicester and NERC Isotope Geosciences Laboratory; Ian Millar, NERC Isotope Geosciences Laboratory

500. Transformations of Sulfides During Aqueous Carbonation of Oil Shale Ash

Kadriann Tamm, Rein Kuusik, Mai Uibu, Juha Kallas, Tallinn University of Technology

501. Carbon Capture and Fixation using Lime-Containing Wastes: The Influence of Aqueous Phase Composition on Ca Dissolution from Oil Shale Ash

Mai Uibu, Rein Kuusik, Tallinn University of Technology

502. CO₂ Mineralisation: Concept for Co-Utilization of Oil Shale Energetics Waste Streams in CaCO₃ Production

Olga Velts, Mai Uibu, Juha Kallas, Rein Kuusik, Tallinn University of Technology

503. Dissolution of Activated Serpentine for Direct Flue Gas Mineralization

Subrahmanian Hariharan, Mischa Werner, Marco Mazzotti, ETH Zurich; Daniela Zingaretti, Renato Baciocchi, University of Rome Tor Vergata

Ocean Storage

504. **Exposure Experiments of Geochemical Reference Samples to Carbon Dioxide**
Nobuo Tsurushima, Namiha Yamada, Masahiro Suzumura, National Institute of Advanced Industrial Science and Technology(AIST)
505. **Effects of Seawater Acidification Induced by CO₂ on Microbial Processes on Dissolved Organic Matter**
Namiha Yamada, Nobuo Tsurushima, Masahiro Suzumura, National Institute of Advanced Industrial Science and Technology (AIST)

Other

506. **Numerical Analysis of Storage Potentials for CO₂ Micro-Bubble Storage (CMS)**
Takashi Hitomi, Kenichiro Suzuki, Obayashi Co; Takumi Shidahara, NEWJEC Inc.; Masayuki Yamaura, Dia Consultants Co.; Masanori Tozawa, Asano Taiseikiso Engineering Co.; Masahiko Tagami, Kawasaki Geological Engineering Co.; Hiroshi Wada, Engineering Advancement Association of Japan
507. **Numerical Study on Field-Scale Behavior of Carbon in CO₂ Micro Bubble Storage (CMS)**
Satoru Miyoshi, Takashi Hitomi, Obayashi Corporation; Hiroshi Wada, Engineering Advancement Association of Japan; Kaoru Inaba, Takenaka Corporation; Masayuki Yamaura, Dia Consultant
508. **Numerical Modelling of Hydrate Formation in Sand Sediment Simulating Sub-Seabed CO₂ Storage in the Form of Gas Hydrate**
Takuya Nakashima, Toru Sato, University of Tokyo; Masayuki Inui, Mitsubishi Heavy Industries, Ltd
509. **Storage Potential and Economic Feasibility for CO₂ Micro-Bubble Storage (CMS) in Japan**
Takumi Shidahara, NEWJEC Inc; Tadahiko Okumura, Hideaki Miida, Engineering Advancement Association of Japan (ENAA); Masato Shimoyama, Ohbayashi Corporation; Norifumi Matsushita, Oyo Corporation; Takashi Yamamoto, Kawasaki Geological Engineering Co. Ltd; Takeshi Sasakura, Kajima Corporation; Toyokazu Ogawa, Taisei Corporation
510. **A Numerical Simulation Study for the Distributed CCS**
Toshiyuki Tosha, GSJ/AIST
511. **The Newly Ecological Concrete Reducing CO₂ Emissions Below Zero Level**
Ichiro Yoshioka, Daisaku Obata, Hideo Nanjo, The Chugoku Electric Power Co,Inc; Kosuke Yokozeiki, Takeshi Torichigai, Kajima Corporation; Minoru Morioka, Takayuki Higuchi, Denki Kagaku Kogyo Co.,Ltd

CCS for Industrial Sources (Non Power)

Cement

512. **Exergy Comparison of CO₂ Capture by Oxy-Combustion and by Antisublimation on a Cement Plant**
Denind Clodic, EReIE-SAS
513. **Integrating Calcium Looping CO₂ Capture with the Manufacture of Cement**
Charles Dean, Nick Florin, Paul Fennell, Thomas Hills, Imperial College London

Iron and Steel

514. **Experimental Studies of Ammonia Solution with Additives for Suppression of Ammonia Vaporization in the Ammonia Based CO₂ Capture Process**
Chi-Kyu Ahn, Kunwoo Han, Man Su Lee, Je Young Kim, Hee Dong Chun, RIST; Yoori Kim, Jong Moon Park, POSTECH
515. **Costs and Potential of Carbon Capture and Storage at an Integrated Steel Mill**
Antti Arasto, Eemeli Tsupari, Janne Kärki, VTT Technical Research Centre of Finland; Miika Sihvonen Jarmo Lilja, Ruukki Metals Oy
516. **Application of Sorption Enhanced Water Gas Shift for Carbon Capture in Integrated Steelworks**
Matteo Gazzani, Giampaolo Manzolini, Matteo Romano, Politecnico di Milano
517. **Steel Industries in Japan Achieve Most Efficient Energy Cut-Off Chemical Absorption Process for Carbon Dioxide Capture from Blast Furnace Gas**
Mikihiro Hayashi, Tomohiro Mimura, NIPPON Steel Engineering Co.,Ltd
518. **Development of PSA System for the Recovery of Carbon Dioxide and Carbon Monoxide from Blast Furnace Gas in Steel Works**
Hitoshi Saima, Yasuhiro Mogi, Takashi Haraoka, JFE Steel Corp.

Refineries

519. **Performance and NOx Emissions of Refinery Fired Heaters Retrofitted to Hydrogen Combustion**
Mario Ditarantom Rahul Anantharaman, Torleif Weydahl, SINTEF Energy Research
520. **CO₂ Capture from Oil and Gas Operations**
Karl Gerdes, Cliff Lowe, Babatunde Oyenekan, Chevron Energy Technology Co.

Other

521. **Investigation into Optimal CO₂ Concentration for CO₂ Capture from Aluminium Production**
Anette Mathisen Morten C. Melaaen, Tel-Tek and Telemark University College; Henriette Sørensen, Tel-Tek

522. Deployment of CCS in Industrial Applications in the EU – Timing, Scope and Coordination

Johan Rootzén, Filip Johnsson, Chalmers University of Technology

523. Techno-Economic Performance of CO₂ Capture-Network Configurations in the Industry: A Case Study for the Dutch Botlek Area

Niels Berghout, Takeshi Kuranochi, Machteld van den Broek, Andrea Ramírez

CCS Technology Assessment and System Integration

CCS and Water Use

524. Techno-Economic Evaluation of Processes for Oxygen and Water Deep Removal from the CO₂ Product Stream

Zeina Abbas, Mohammad Abu Zahra, Toufic Mezher, Masdar Institute of Science and Technology

525. IEAGHG Investigation of Extraction of Formation Water from CO₂ Storage

Ryan Klapperich, Robert Cowan, Charles Gorecki, Guoxiang Liu, Jordan Bremer, Yevhen Holubnyad, Nicholas Kalenze, Damion Knudsen, EERC; Ludmilla Basava-Reddi, IEAGHG; Andrea McNemar, U.S. Department of Energy

Costs

526. Making CCS Pay for Itself: Storage Strategies in Geopressed/Geothermal Aquifers

Reza Ganjdanesh, Steven Bryant, Gary Pope, Kamy Sepehrnoori, The University of Texas at Austin

527. Economic Evaluation of Ship-Based CCS with Availability

Youngkyun Seo, Daejun Chang, Korea Advanced Institute of Science and Technology; Jung-Yuel Jung, Cheol Huh, Seong-Gil Kang, Korea Ocean Research & Development Institute

528. Costs and Performance of Advanced Zero Emission Systems of IGCC with CCS in Japan

Koji Tokimatsu, Shigeki Tsuboi, Junichi Iritani, Masaki Onozaki, The Institute of Applied Energy

529. Optimization and Cost Evaluation of Integrated Aqueous Ammonia Capture with Mineralisation using Recyclable Salts for Distributed CCS

Xiaolong Wang, Mercedes Maroto-Valer, University of Nottingham

Energy Efficiency in CCS Systems

530. CO₂ Capture Processes: Novel Approach to Benchmarking and Evaluation of Improvement Potentials

Rahul Anantharam, Kristin Jordal, SINTEF Energy Research; Truls Gundersen, NTNU

531. Exergy Analysis for Ultra-Supercritical Power Plant

Sandhya Hasti, Andy Aroonwilas, Amornvadee Veawab, University Of Regina

Integrated CCS Systems

532. Design and Analysis of CO₂ Networks

Ahmed Alhajaj, Nilay Shah, Imperial College London

Integration of CCS in Present and Future Energy Systems

533. On Methods for Maturity Assessment of CO₂ Capture Technologies

Hamidreza Bakhtiary-Davijany, DNV

534. Perspectives of CO₂ Value Chains on Distributed Energy Systems for Gas Industry

Susumu Nishio, Takuto Isshiki, Hiromichi Kameyama, Tokyo Gas Co, Ltd; Ziqiu Xue, RITE

535. Assessment of Low Carbon Energy Technologies: Fossil Fuels and CCS

Andrea Ramirez, Utrecht University; Bhavik Bakashi, Ohio State University; Edgar Hertwich, NTNU

Need for Flexibility

536. Dynamic Modelling and Validation of Post Combustion CO₂ Capture Plants in Australian Coal-Fired Power Stations

Mai Bui, Indra Gunawan, Vincent Verheyen, Monash University; Erik Meuleman, Paul Feron, CSIRO

537. Market Driven Operation: Flexible Operating Mechanisms for Post Combustion Capture

Earl Goetheer, Robert de Kler, TNO

538. Optimal Heat Management in an Integrated Fossil-Renewable Energy System with CO₂ Capture

Charles Kang, Adam Brandt, Louis Durlowsky, Stanford University

Risk Assessment

539. **Integrated Risk Assessment for CCS**
Matt Gerstenberger, Rob Buxton, Annemarie Christopherson, Andy Nicol, GNS Science and CO2CRC; Guy Allinson, Wanwan Hou, CO2CRC and University of New South Wales; Greg Leamon, CO2CRC and Geoscience Australia
540. **Common Themes in Risk Evaluation Among Eight Geosequestration Projects**
Ken Hnottavange-Telleen, Schlumberger Carbon Services
541. **Risk Based Qualification and Verification of Large-Scale CO₂ Absorption Processes**
Tore Myhrvold, Erik T. Hessen, Hamidreza Bakhtiary-Davijany, Det Norske Veritas AS
542. **Identification of Hazards and Environmental Impact Assessment for an Integrated Approach to Emerging Risks of CO₂ Capture Installations**
Nicola Paltrinieri, Valerio Cozzani, University of Bologna; Leo Breedveld, 2B Consulenza Ambientale; Jill Wilday, Health and Safety Laboratory
543. **Development of Risk Assessment Tool for CO₂ Geological Storage 'GERAS-CO2GS'**
Atsuko Tanaka, Yasuhide Sakamoto, Takeshi Komai, National Institute of Advanced Industrial Science (AIST)

Whole System LCA Studies

544. **Full Chain Analysis and Comparison of Alternative Gas-Fired Power Plants with CO₂ Capture and Storage with Clean Coal Alternatives**
Zhenggang Nie, Anna Korre, Sevet Durucan, Imperial College London
545. **Life-Cycle GHG Emission Factors of Final Energy in China**
Lixue Jiang, Xunmin Ou, Linwei Ma, Zheng Li, Weidou Ni, Tsinghua University
546. **Environmental Performance Tool for CCS Chains**
Joris Koornneef, Anouk Florentinus, Ruut Brandsma, Ecofys; Arjan van Horssen, Toon van Harmelen, Utrecht University; Andrea Ramirez, Alireza Talaei, TNO; Arjan Plomp, Jeroen van Deurzen, Koen Smekens, ECN
547. **Environmental Assessment of Coal-Fired Oxyfuel Power Plants - Cryogenic vs. Membrane-Oxygen Production**
Peter Markewitz, Andrea Schreiber, Petra Zappm Josefine Marx, Research Centre Juelich

Other

548. **Developing Framework for Multi-Criteria Analysis of CCS A Standardized Approach to the Assessment of CCS Projects**
Jana Jakobsen, Mona Mølnevik, Grethe Tangen, SINTEF Energy Research

Transport and Infrastructure Development

CO₂ Quality Issues

549. **Effect of SO₂ and NO₂ on Corrosion and Solid Formation in Dense Phase CO₂ Pipelines**
Arne Dugstad, Bjørn Morland, Malgorzata Halseid, Institute for Energy Technology
550. **CO₂ Mix Project: Experimental Determination of Thermo-Physical Properties of CO₂-Rich Mixtures**
Sigurd Weidemann Løvseth, Geir Skaugen, H.G. Jacob Stang, Jana P. Jakobsen, Øivind Wilhelmsen, SINTEF Energy Research; Roland Span, Robin Wegge, Ruhr-Universität Bochum
551. **Accurate Measurements of CO₂-Rich Mixture Phase Equilibria Relevant for CCS Transport and Conditioning**
H.G. Jacob Stang, Sigurd Weidemann Løvseth, Sigmund Ø. Størset, Bjarne Malvik, Håvard Reksted, SINTEF Energy Research

Hubs and Transport Networks

552. **An Integrated Approach for Risk Assessment of CO₂ Infrastructure in COCATE Project**
Todd Flach, Knut Kvien, Semere Solomon, Det Norske Veritas; Oswaldo Morales Napoles, Corina Hulsbosch-Dam; Mark Spruijt, TNO
553. **CO₂ Transport Solutions in the Skagerrak / Kattegat Region**
Ragenhild Skagestad, Anette Mathisen, Hils Henrik Eldrup, Hans Aksel Haugen, Tel-Tek
554. **Dynamics of Carbon Dioxide Transport in a Multiple Sink Network**
Jérémy Veltin, Stefan Belfroid, TNO

Pipelines

555. **Experimental Investigation of CO₂ Outflow from High Pressure Reservoirs**
Mohammad Ahmad, Luuk Buit, DNV-KEMA; Corina Hulsbosch-Dam, Mark Spruijt, TNO
556. **PVTx Properties of a Two-Phase CO₂ Jet from Ruptured Pipeline**
Helle Augdal Botnen, Guttorm Alendal, Ivar Aavatsmark, University of Bergen; Abdirahman Omar, Uni-Bjerknes and Uni-Researchs and Bjerknes Centre for Climate Research; Trul Johanessen, Geophysical Institute, University of Bergen and Uni-Bjerknes

557. Experimental Study of N₂ Impurity Effect on the Steady and Unsteady CO₂ Pipeline Flow
Meang-Ik Cho, Cheol Huh, Jung-Yeul Jung, Seong-Gil Kang, KORDI

558. Optimal Pipeline Design with Increasing CO₂ Flow Rates
Zikai Wang, Gustavo Fimbres Weihs, Dianne Wiley, CO₂CRC and The University of New South Wales; Gina Cardenas, CO₂CRC

559. A Phased Approach to Building a Pipeline Network for CO₂ Transport During CCS
Melanie Jensen, Peng Pei, Peter A. Letvin, Anthony Snyder, Robert Cowan, Charles Gorecki, Edward Steadman, EERC

560. CO₂ Pipeline Integrity: A Coupled Fluid-Structure Model Using a Reference Equation of State for CO₂
Eskil Aursand, Peder Aursand, Morten Hammer, Svend Tollak Munkejord, SINTEF Energy Research; Torodd Berstad, Cato Dørum, Håkon Nordhagen, SINTEF Materials and Chemistry

561. Engineering and Material Challenges for High Pressure Dense Phase CO₂ Pipeline Transport in Flow Mode
Kumar Patchigolla, John Oakley, Cranfield University

562. Corrosion Effects in Pressurized CO₂ Containing Impurities
Aki Sebastian Ruhl, Axel Kranzmann, BAM Federal Institute for Materials Research and Testing

563. Corrosion of Pipe Steel in CO₂ with Impurities and Possible Solutions
Xiaolong Zhang, John Zevenbergen, Mark Spruijt, TNO; Marta Borys, Acccoat

Shipping

564. Ships Versus Pipeline Transport
Chris Hendriks, Pieter van Breevoort; Andrea Ramirez, Utrecht University

565. Cargo Conditions of CO₂ in Shuttle Transport by Ships
Noriyuki Kokubun, Chiyoda Corporation; Kiyohiko Ko, Sasebo Heavy Industries Co, Ltd; Masahiko Ozaki, The University of Tokyo; Holger Bietz, Global CCS Institute

566. Offshore Operational Availability of Onboard Direct Injection of CO₂ into Sub-Seabed Geological Formations
Tsuyoshi Miyazaki, Hiroyuki Osawa, Masami Matsuura, Japan Agency for Marine-Earth Science and Technology; Makoto Ohta, Mitsubishi Heavy Industries, Ltd; Masahiko Ozaki, The University of Tokyo; Holger Bietz, Global CCS Institute

567. Onboard CO₂ Injection to Sub-Seabed Geological Formations via Picked-Up Flexible Pipe
Naoki Nakazawa, Systems Engineering Associates, Inc; Kyozo Kikuchi, SEMTEC, Inc; Kenichi Ishii, Yakumu Yamaguti, Furukawa Electric Co, Ltd; Makoto Ohta, Mitsubishi Heavy Industries, Ltd; Masahiko Ozaki, The University of Tokyo; Holger Bietz, Global CCS Institute

568. Ship-Based Offshore CCS Featuring CO₂ Shuttle Ships Equipped with Injection Facilities
Masahiko Ozaki, The University of Tokyo; Takashi Ohsumi, Central Research Institute of Electric Power Industry; Ryuichiro Kajiyama, Central Research Institute of Electric Power Industry; Holger Bietz, Global CCS Institute

569. Regulations on Ship Transport and Onboard Direct Injection of CO₂ into Sub-Seabed Geological Formations
Satoshi Suzuki, Takashi Nakamura, Japan NUS Co, Ltd; Motoshi Muraoka, Shintaro Higashi, NTT Data Institute of Management Consulting, Inc; Takashi Ohsumi, Central Research Institute of Electric Power Industry; Holger Bietz, Global CCS Institute

570. A Feasibility Study on CO₂ Marine Transportation in South Korea
Byeong-Yong Yoo, Seung-Bae Kim, Il-Guk Woo, Yeong-tae Oh, Sung-Geun Lee, DSME

Source Sink Matching

571. CO₂ Transport Strategy for the Offshore CCS in Korea
Jung-Yuel Jung, Cheol Huh, Seong-Gil Kang, Korea Ocean Research & Development Institute; Youngkyun Seo, DaeJun Chang; Korea Advanced Institute of Science and Technology

572. Source-Sink Matching for Carbon Capture and Storage in Eastern India and its Economic Aspects
Priyank Jain, Khanindra Pathak, Swarup Tripathy, Indian Institute of Technology

Other

573. **Techno-Economic Assessment of On-Board Decarbonization of Liquid Fuel for CO₂ Emission Reduction from Mobile Sources**
Hasan Imran, Saudi Aramco
574. **Integrated Techno-Economic and Environmental Benchmark of Two CO₂ Transport Technologies**
Simon Roussanly, Erik Hognes, Jana Jakobsen, Sintef Energy Research
575. **Conceptual Design of CO₂ Transportation System for CCS**
Takakazu Suzuki, ENAA; Makoto Toriumi, Universal Shipbuilding Corporation; Takuya Sakemi, Taisei Corporation; Naokki Masui, Obayashi Corporation; Shuhu Yano, Mitsubishi Heavy Industries, Ltd; Hideki Fujita, Mitsui Engineering & Shipbuilding Co. Ltd; Hironori Furukawa, JFE Engineering Corporation
576. **Logistical and Economical Benefits of Using Offshore Thermal Power in a Future CCS Scheme**
Björn Windén, Philip Wilson, Ajit Sheno, University of Southampton; Mingsheng Chen, National University of Singapore; Naoya Okamoto, Universal Shipbuilding Corporation; Do Kyun Kim, Pusan National University; Elizabeth McGraig, London Design Support Office

Towards Negative CO₂ Emissions

Biomass Energy Use Combined with CCS

577. **Pilot-Scale Investigation of an Innovative Process for Biogas Upgrading with CO₂ Capture and Storage**
Renato Baciocchi, Giulia Costa, Daniela Zingaretti, University of Rome; Tor Vergata; Ennio Carnevale, Lidia Lombardi, Tommaso Olivieri, Alessandra Paradisi, Laura Zanchi, University of Florence
578. **Techno-Economic Study of Biomass Co-Firing with and without CO₂ Capture in an Australian Black Coal-Fired Power Plant**
Zakieh Khorshidi, Minh Ho, Dianne Wiley, The University of New South Wales and CO2CRC
579. **Bio-CCS: Co-Firing of Established Greenfield and Novel, Brownfield Biomass Resources Under Air, Oxygen-Enriched Air and Oxyfuel Conditions**
Sam Pickard, Sayed Daood, William Nimmo, Mohamed Pourkashanian, University of Leeds; Richard Lord, University of Strathclyde

Capturing CO₂ from the Air

580. **Capturing Atmospheric CO₂ Using Supported Amine Sorbents**
Wim Brilman, Rens Veneman, University of Twente

581. **A Moisture Swing Sorbent for Direct Air Capture of Carbon Dioxide: Thermodynamic and Kinetic Analysis**

Tao Wang, Klaus Lackner, Columbia University

Other

582. **Brazilian Renewable Carbon Capture and Geological Storage Map: Possibilities for Parana Basin**
Claudia Xavier Machado, Gabriela Camboim Rockett, João Marcelo Medina Ketzner, Center of Excellence in Research and Innovation in Petroleum, Mineral Resources and Carbon Storage

Legal and Regulatory Aspects of CCS and Long Term Liability of CO₂ Storage

Developments

583. **Options to Implement a Regulatory Framework to Accommodate Geological Storage of CO₂ in Saskatchewan, Canada**
Jose Condor, Johnson-Shoyama School of Public Policy / Alberta Department of Energy; Malcolm Wilson, Petroleum Technology Research Center
584. **The Saskatchewan Environmental Code: A Provincial Approach for Managing GHGs Emissions**
Jose Condor, Johnson-Shoyama School of Public Policy / Alberta Department of Energy; Malcolm Wilson, Petroleum Technology Research Center

Health and Safety

585. **Suicide by Catalytic Converter and Deaths at Lake Nyos; Is Carbon Monoxide the Toxic Agent? Implications for Leakage Risks from CO₂ Pipelines**
Ian Duncan, BEG, University of Texas at Austin

Requirements

586. **EU FP7 CO₂ Europe: Towards a European CO₂ Transport Infrastructure**
Filip Neele, TNO, Tom Mikunda, Ad Seebregts, ECN; Stijn Santen, CO₂-Net; Anton van der Burgt, Stedin, Ola Nestaas, Sigve Apeland, Gassco; Sarah Stiff, E.ON New Build & Technology; Carl Hustad, CO₂-Global
587. **How to Submit a CO₂ Storage Permit: Identifying Appropriate Geological Site Characterisation to Meet European Regulatory Requirements**
Jonathan Pearce, Sarah Hannis, Gary Kirby, Maxine Akhurst, Martyn Quinn, BGS; Carsten Nielsen, Peter Frykman, GEUS Danish Geological Survey; Finn Dalhoff, Vattenfall; Florence Delprat-Jannaud, IFPEN Energie Nouvelles

Other

588. A Study on Regulatory Requirements of CCS Technology Development in Taiwan

Ju-Hsiu Cheng, Joey Lu, Tseng-Hsiang Chieh, Chun-Yu Chen, Industrial Technology Research Institute

589. Carbon Capture Regulation for Three Industrial Sectors in the UAE: An Empirical Analysis

I-Tsung Tsai, Sanaa El Waddi, Masdar Institute of Science and Technology; Othman Zarzour, Masdar Carbon Unit

590. Interaction of CO₂ with Subsurface Resources

Brad Field, Robb Funnell, CO2CRC; Stephan Bachu, John Faltison, Alberta Innovates – Technology Futures; Ludmilla Basava-Reddi, IEAGHG; Mark Bunch, CO2CRC and University of Adelaide; Sam Holloway, BGS; Rick Richardson, CanZealand Geoscience Ltd

Energy and Climate Change Policies and CCS

Beyond Kyoto

591. Comprehensive Analysis of Measures Towards Sustainable Development and Climate Stabilization: ALPS Scenarios

Miyuki Nagashima, Fuminori Sano, Ayami Hayashi, Takashi Homma, Junichiro Oda, Kenichi Wada, Kohko Tokushige, Toshimasa Tomoda, RITE; Keigo Akimoto, RITE and The University of Tokyo

The Role of CCS in Future Energy Systems: Scenario Studies

592. Evaluating the Role of Carbon Capture and Storage as a Remedial Solution for Climate Change Issue in the Future of Iran's Energy System

Zoya Banan, Abbas Maleki, Sharif University of Technology

593. Role of CCS in a New International Climate Regime

Fenjun Duan, Tetsuo Yuhara, The Canon Institute for Global Studies; Hiroshi Ujita, Tokyo Institute of Technology; Kauhio Tsuzuki, Toshikazu Shindou, The Institute of Applied Energy

594. Technical and Financial Assessment of Large-Scale Deployment of CCS Under Current U.S. Regulations: Role of CO₂ Interim Storage and Enhanced Oil Recovery

Karim Farhat, Josh Coplin, Daniel Lewis, Sebastian Peterlin, Ramon Simms, Stanford University

595. Cost Development and Economic Value of Implementing CCS in the United Kingdom

Chris Hendriks, Joris Koornneef, Ecofys; Jason Eis, Mathew Billson, Carbon Trust, DECC

596. A Sensitivity Analysis of the Global and Regional Deployment of CCS to the Cost of Storage

Barbara Koebl, Machteld van den Broek, André Faaij, Utrecht University; Bas van Ruijven, NCAR; Detlef van Vuuren, Netherlands Environmental Assessment Agency

597. Determining the Potential for Carbon Capture and Storage in Southeast Asia

Pradeep Thakaran, Jia Li, University of Exeter; Douglas Macdonald, Xiaodong Pei, Rick Hasselback, Bishal Thapa, Karthik Ganesan, Maria Christina Pascaul, Independent Consultant; Bill Gunter, G BACH Enterprises Inc; Craig Hart, Johns Hopkins University

598. Analysis of the CCS Considering Environment Co-Benefit of Air Pollutants in China

Jianguo Liang, Akinobu Murata, National Institute of Advanced Industrial Science and Technology

599. The Role of CCS in Meeting Emissions Reductions Goals in a 2°C Scenario

Sean McCoy, Justine Garrett, Uwe Remme, Nathalie Trudeau, Antonia Gawel, International Energy Agency

600. Forecast of Advanced Technology for Coal Power Generation Towards the Year of 2050 in CO₂ Reduction Model of Japan

Takashi Makamura, Keiji Makino, Japan Coal Energy Center

601. Analysis of CCS Impacts on Asian Energy Security

Junichiro Oda, Fuminori Sano, Miyuki Nagashima, Kenichi Wada, Toshimasa Tomoda, RITE; Keigo Akimoto, RITE and The University of Tokyo

602. Cost of Delaying Carbon Capture and Utilization / Sequestration (CCS) Development

Sadia Raveendran, Howard Herzog, Massachusetts Institute of Technology

603. Analysis of CCS Diffusion for CO₂ Emission Reduction Considering Technology Diffusion Barriers in the Real World

Fuminori Sano, Keigo Akimoto, Kenichi Wada, Miyuki Nagashima, RITE

Policy Approaches

604. **California's Policy Approach to Develop Carbon Capture, Utilization and Sequestration as a Mitigation Technology**
Elizabeth Burton, Lawrence Berkeley National Laboratory; Niall Mateer, California Institute for Energy & Environment; John Henry Beyer, Lawrence Berkeley National Laboratory
605. **Restriction of Carbon Intensity Reduction and its Implications for Policymakers in Guangdong Province, China**
Bing Bai, Xiaochun Li, Qi Li, Lu Shi, Institute of Rock and Soil Mechanics

Other

606. **Development of Strategies for CO₂ Value Chain Deployment: ECCO - European Value Chain for CO₂**
Kristin Jordal, Jana P. Jakobsen, Petter Røkke, SINTEF Energy Research; Laetitia Birkeland, The Bellona Foundation; Charles Eikhoff, Progressive Energy Limited; Joris Morbee, European Commission, DG JRC
607. **The State of Development of the UK CCS Industry: An Expert Questionnaire and Systems-Based Approach**
Sam Pickard, Timothy Foxon, University of Leeds
608. **Preliminary Assessment on Deployment of Carbon Capture and Storage in Nigeria**
Abubakar Usman, Newcastle University, UK
609. **The GDCCSR Project Promoting Regional CCS-Readiness in the Guangdong Province, South China**
Di Zhou, Diaqing Zhao, Xiaochun Li, Guangzhou Chinese Academy of Sciences; Qiang Liu, Chinese National Development Committee; Jia Li, LinksChina Investment Advisory Ltd; Jon Gibbins, Edinburgh University; Xi Liang, Cambridge University

Public Perception and Acceptance of CCS and Communication on CCS

Public Perception

610. **Communicating CCS: Effects of Text-Only and Text-and-Visual Depictions of CO₂ Storage on Risk Perceptions and Attitudes**
Suzanne Brunsting, Marjolein De Best-Waldhober, ECN; Hauke Riesch, David Reiner, Cambridge University
611. **CO₂ Capture Project's CCS Stakeholder Issues Review and Analysis**
Ioannis Chrysostomidis, Shahila Perumalpillai, ERM; Mark Bohm, Suncor Energy; Mark Crombie, Suncor Energy/ICO2N Initiative; Eric Beynon, Arthur Lee, Chevron

Communication Activities and Experiences

612. **Engaging the Community with a "Green Town" Concept**
Ning Chen, The University of Western Australia; Mirjam Fürth, R.Ajit Sheno, Philip A. Wilson, University of Southampton; Michael C. Johnson, Lloyd's Register; Zhi Yung Tay, National University of Singapore
613. **Stakeholder Perceptions on Carbon Capture and Storage Technologies in Finland – Economic, Technological, Political and Societal Uncertainties**
Laura Kainiemi, Arho Toikka, Carl-Johan Fogelholm, Helsinki University
614. **Public Engagement of Carbon Capture and Storage (CCS) in South Africa**
Sharon Mashau, Brendan Beck, South African Centre for Carbon Capture and Storage (SACCCS)
615. **Emergency Response Planning: An Example of International Collaboration in CCS Community Outreach and Project Development**
Norman Sacuta, Petroleum Technology Research Centre; Lori Gauvreau, Schlumberger Carbon Services; Sallie Greenberg, Illinois State Geological Survey

Knowledge Sharing

616. **Developing a CCS Communication Framework for Japan**
Hidemitsu Shimada, Tsukasa Kumagai, JGC Corporation; Hiroyasu Takase, Quintessa Japan; Ian McKinley, McKinley Consulting; Satoshi Someya, National Institute of Advanced Industrial Science and Technology; Angus Henderson, Sean McClowry, Toshihiki Miyagawa, Global CCS Institute

Social Science Research

617. **Public Preferences to CCS: How Does it Change Across Countries?**
Peta Ashworth, Naomi Boughen, Talia Jeanneret, Karen Stenner, CSIRO; Edna Edna Einsiedel, Amanda Boyd, University of Calgary; Rhys Howell, Simon Shackley, University of Edinburgh; Suzanne Brunsting, Bas Van Bree, ECN
618. **Awareness, Knowledge and Perceptions of Carbon Capture and Storage: Trends in Public Opinion Development**
Suzanne Brunsting, Mia Paukovic, Marjolein de Best-Waldhober, Koen Straver, ECN
619. **Developing an Interactive Survey Game for Informing Opinions About CCS**
Anne-Marie Dowd, Peta Ashworth, CSIRO; Mia Paukovic, Marjolein de Best-Waldhober Koen Straver, ECN

620. 'Tell Me What You Think About The Geological Storage of Carbon Dioxide': Towards a Fuller Understanding of Public Perceptions of CCS

Leslie Mabon, Simon Shackley, University of Edinburgh; Samuela Vercelli, Barbara Cordella, Jonathan Anderlucci, Università di Roma 'La Sapienza'; Kelvin Boot, Plymouth Marine Laboratory

621. An Interactive Physical Model for the CCS Chain

Sam Pickard, Tom Lynch, James McKay, Sandy Black, University of Leeds

622. 'Not In My Back Yard' (NIMBY) Sentiments and the Structure of Initial Local Attitudes Toward CO₂ Storage Plans

Bart W. Terwel, Dancker Daamen, Emma Ter Mors, Leiden University

623. Informing People About CCS: A Review of Social Research Studies

Samuela Vercelli, Jonathan Anderlucci, Salvatore Lombardi, Nadia Battisti, Barbara Cordella, Rosanne Memoli, Università di Roma 'La Sapienza'; Leslie Mabon, Scottish Carbon Capture and Storage, University of Edinburgh

Special Thanks

The Organisers would like to take this opportunity to thank all delegates, sponsors, supporters and contributors to the conference, without whom, it would not have been possible to arrange this conference.

Sponsors, supporters and contributors are listed in the following pages, but we would also like to express our sincere notes of thanks and gratitude to the following. Again without their support, input and contributions, the conference would not have been as successful:

- Ministry of Economy, Trade and Industry (METI)
- Kyoto Prefectural Government
- Kyoto City Government
- Kyoto Chamber of Commerce and Industry
- Kyoto Convention Bureau
- Japan Sake and Shochu Makers Association
- Nadagogo Brewers Association

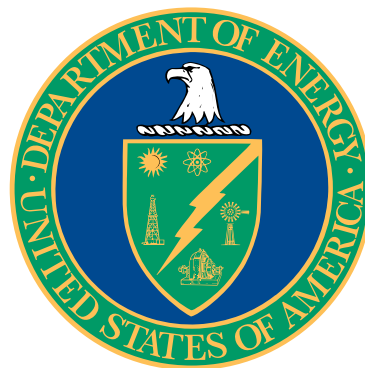
Silver Sponsors

80



HITACHI
Inspire the Next

TOSHIBA
Leading Innovation >>>



Bronze Sponsors



JX Nippon Oil & Energy Corporation



CHIYODA



GASSNOVA



Supporters



China National Petroleum Corporation (CNPC)



Contributors

- The Federation of Electric Power Companies of Japan
- The Japan Gas Association
- The Japan Iron and Steel Federation
- Kawasaki Heavy Industries Ltd.
- Petroleum Association of Japan
- Sumitomo Chemical Co., Ltd.
- TOYOTA MOTOR CORPORATION

